



Tshwane University
of Technology

We empower people

RESEARCH INNOVATION AND ENGAGEMENT



2021 ANNUAL REPORT



Tshwane University of Technology

We empower people

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PART A: GENERAL INFORMATION

RESEARCH, INNOVATION AND ENGAGEMENT

The Tshwane University of Technology (TUT) embarked on a process of reviewing its strategic plan, which led to a Council approved Institutional Strategic Plan (ISP) 2020-2025. Accordingly, a new vision for TUT, "A people's university that makes knowledge work" and the new mission of the University, "We advance social and economic transformation through relevant curricula, impactful research and engagement, quality learning experiences, dedicated staff and an enabling environment" were also formulated. The ISP 2020-2025 has four pillars and ten goals that guided each environment to identify subgoals for the next six years and their related activities. In 2021, the Research, Innovation and Engagement's (RIE) six-year plan subgoals were aligned with the ISP 2020-2025.



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CAMPUS MANAGEMENT



Prof Polly Mashigo

Executive Dean of Economics and Finance,
Interim Campus Rector



Dr Etienne Van Wyk

Executive Dean of ICT, Interim
Campus Rector (Soshnaguve)



Prof Ingrid Mokgobu

Assistant Dean of Teaching and Learning,
Interim Campus Rector (Pretoria)

Contact Details

Reporting faculties	Contact	Physical Address
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<ul style="list-style-type: none"> • Arts and Design • Engineering and the Built Environment • Management Sciences • Science 	012 382 5328/ 4820	Staatsartillerie Road, Pretoria West GPS: (25°43'53.55"S, 28°09'40.38"E)
<ul style="list-style-type: none"> • Humanities • Information and Communication Technology 	012 382 9240/ 9689	2 Aubrey Matlala Road, Block K, Soshanguve GPS: (25°32'25.1"S, 28°05'48.8"E)



FACULTY OF ECONOMICS AND FINANCE



Prof Polly Mashigo

Executive Dean of Economics and Finance,
Interim Campus Rector

The Faculty of Economics and finance consists of five academic departments:

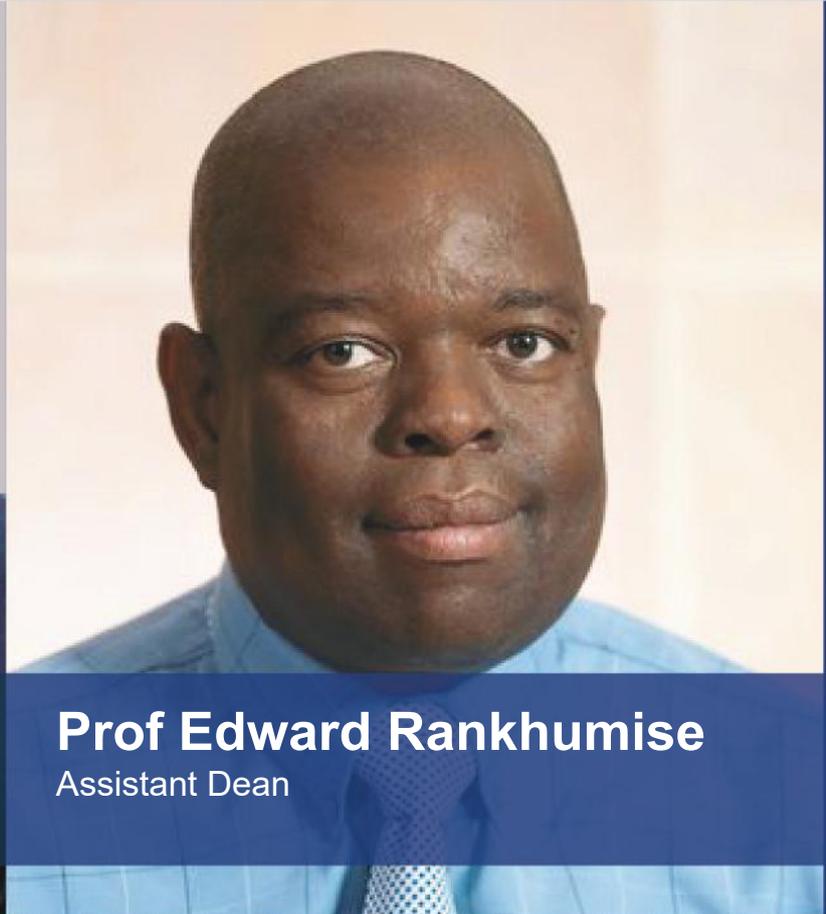
- Department of Accounting
- Department of Auditing
- Department of Economics
- Institute for Economics, Research and Innovation
- Department of Managerial Accounting and Finance
- Department of Public Sector Finance



FACULTY OF MANAGEMENT SCIENCES



Dr Edgar Nesamvuni
Executive Dean



Prof Edward Rankhumise
Assistant Dean

The Faculty of Management Sciences consists of eight academic departments and two academic units:

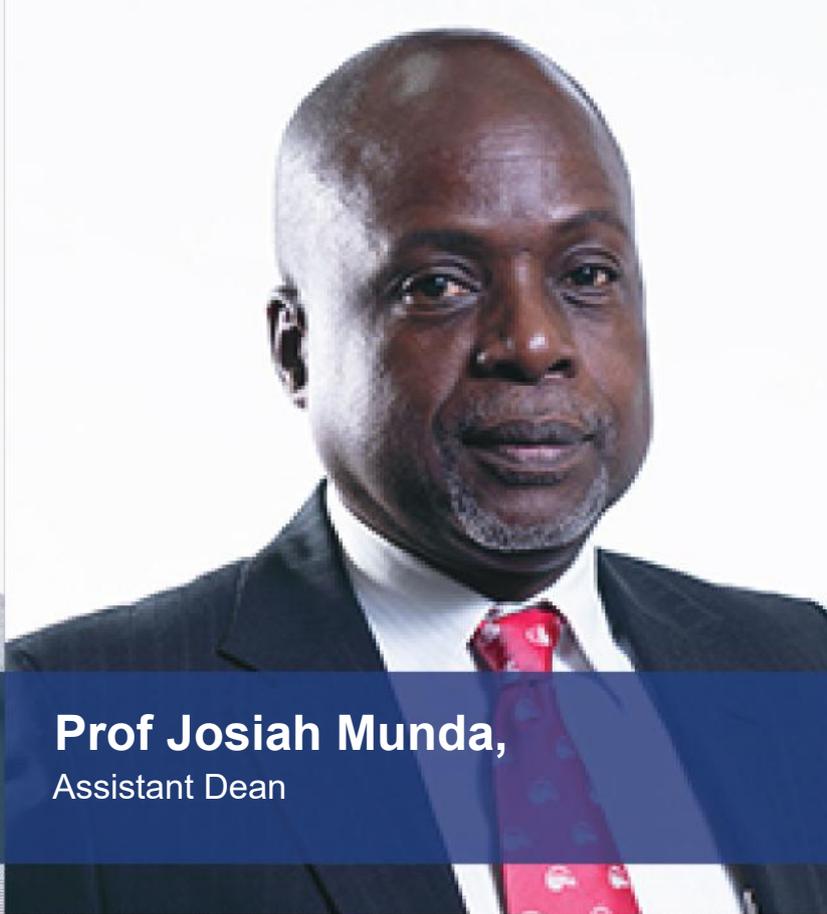
- Business Information Management Services
- Business School
- Hospitality Management
- Management and Entrepreneurship
- Marketing, Supply Chain Management and Sport Management
- Operations Management
- People Management and Development
- Tourism Management



FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT



Dr Grace Kanakana
Executive Dean



Prof Josiah Munda,
Assistant Dean

The Faculty of Engineering and the Built Environment consists of eight academic departments:

- Department of Architecture and Industrial Design
- Department of Building Science
- Department of Chemical, Metallurgical and Materials Engineering
- Department of Civil Engineering
- Department of Electrical Engineering
- Department of Geomatics
- Department of Industrial Engineering
- Department of Mechanical and Mechatronics Engineering



FACULTY OF HUMANITIES



**Prof Mashupye
Maserumule**

Executive Dean

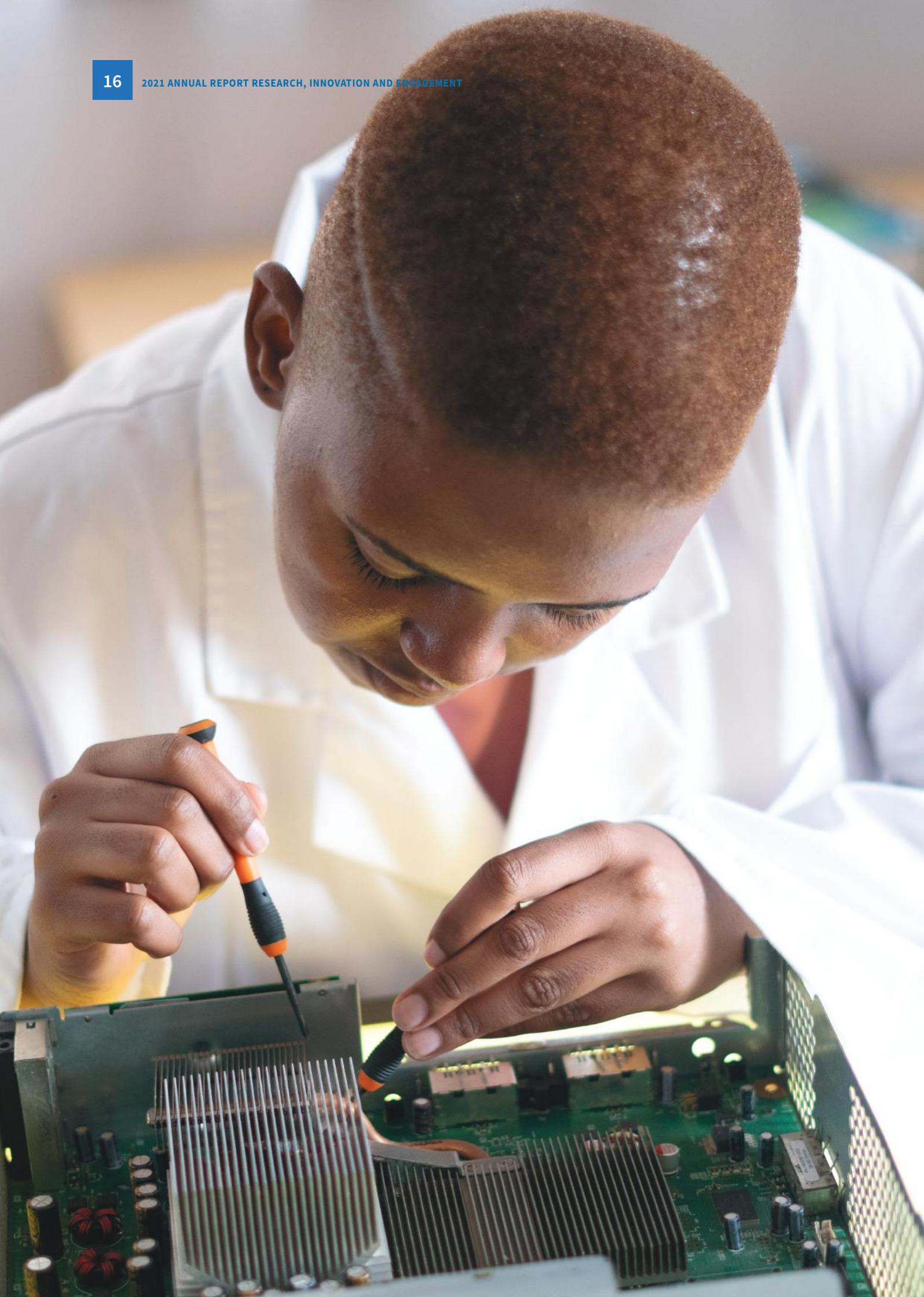


Prof Thelma de Jager

Assistant Dean

The Faculty of Humanities consists of ten academic departments:

- Department of Applied Languages
- Department of Integrated Communication
- Department of Journalism
- Department of Law
- Department of Public Management
- Department of Safety and Security Management
- School of Education (Primary Education, Foundation Education, Technology & Vocational Education and Maths, Science and Business Education)



FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)



Dr Etienne van Wyk
Executive Dean



Dr Agnieta Pretorius
Assistant Dean

The Faculty of ICT consists of four academic departments and two academic units:

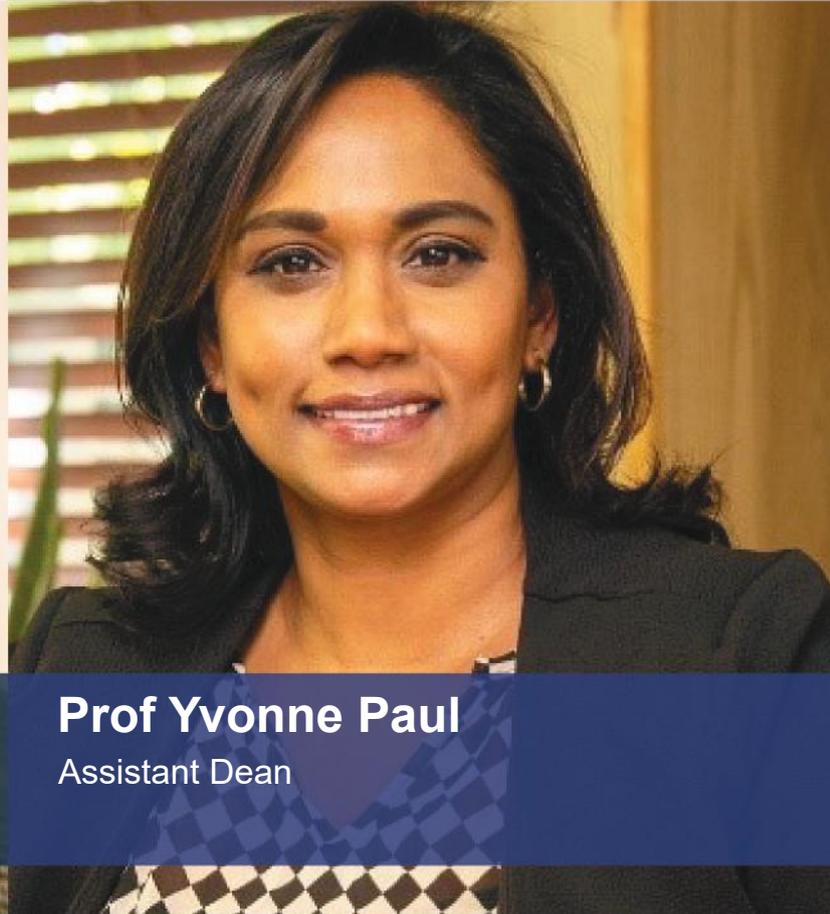
- Department of Computer Systems Engineering
- Department of Informatics
- Department of Information Technology
- End User Computing Unit
- First Year and Foundation Unit



FACULTY OF SCIENCE



Prof Prince Ngobeni
Executive Dean



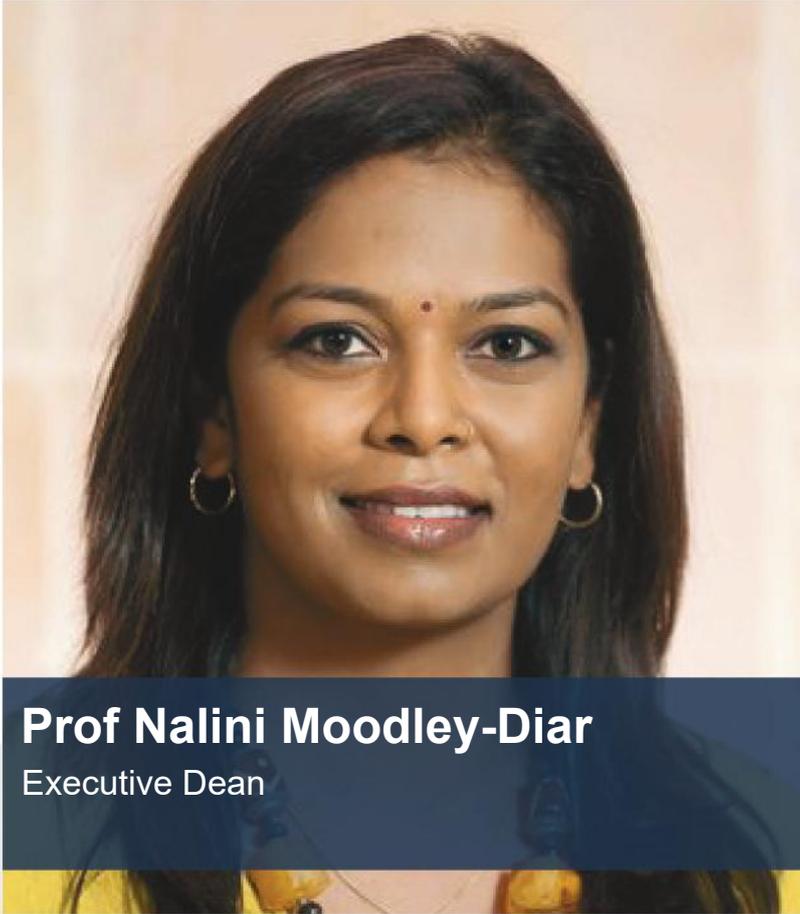
Prof Yvonne Paul
Assistant Dean

The Faculty of Science consists of fourteen academic departments:

- Department of Animal Sciences
- Department of Biomedical Sciences
- Department of Biotechnology and Food Technology
- Department of Chemistry
- Department of Crop Sciences
- Department of Environmental Health
- Department of Environmental Water and Earth Sciences
- Department of Horticulture
- Department of Mathematics and Statistics
- Department of Nature Conservation
- Department of Pharmaceutical Sciences
- Department of Physics
- Department of Sport, Rehabilitation and Dental Sciences
- Adelaide Tambo school of Nursing Sciences



FACULTY OF ARTS AND DESIGN



Prof Nalini Moodley-Diar
Executive Dean

The Faculty of Arts and Design consists of six academic departments:

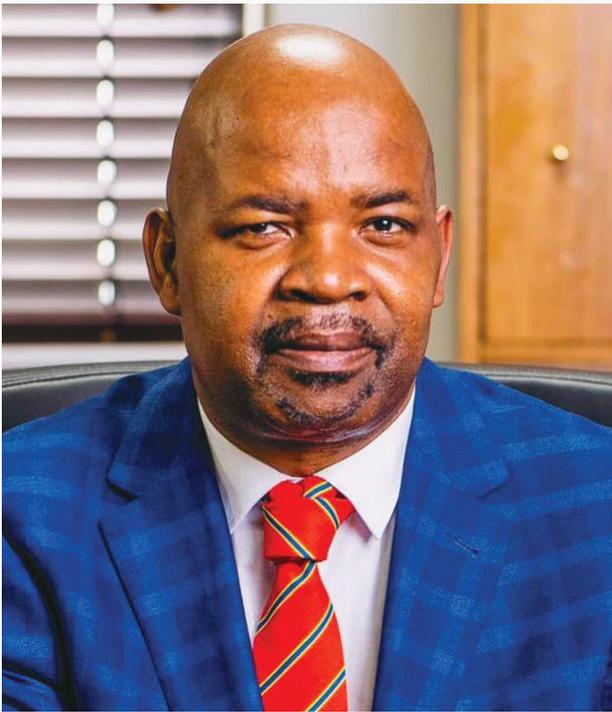
- Department of Design Studies
- Department of Interior Design
- Department of Fine & Studio Arts
- Department of Performing Arts
- Department of Visual Communication



LIST OF ABBREVIATIONS/ACRONYMS

BAAP	BLACK ACADEMIC ADVANCEMENT PROGRAMME
CCI	CITY CHANGERS INSTITUTE
CFO	CHIEF FINANCIAL OFFICER
CREST	CENTRE FOR RESEARCH ON EVALUATION, SCIENCE AND TECHNOLOGY
DHET	DEPARTMENT OF HIGHER EDUCATION AND TRAINING
DIES	DIALOGUE ON INNOVATIVE HIGHER EDUCATION STRATEGIES
DQP	DIRECTORATE OF QUALITY PROMOTION
DRI	DIRECTORATE OF RESEARCH AND INNOVATION
DVC	DEPUTY VICE-CHANCELLOR
ICT	INFORMATION AND COMMUNICATION TECHNOLOGY
IP	INTELLECTUAL PROPERTY
M&D	MASTERS AND DOCTORAL
NRF	NATIONAL RESEARCH FOUNDATION
PRIPOL	POSTGRADUATE RESEARCH AND INNOVATION POLICY
R&I	RESEARCH AND INNOVATION
RIPPOL	RESEARCH INNOVATION PARTNERSHIP POLICY
SATN	SOUTH AFRICAN TECHNOLOGY NETWORK
SCPS	SENATE COMMITTEE FOR POSTGRADUATE STUDIES
SCRI	SENATE COMMITTEE FOR RESEARCH AND INNOVATION
THENSA	TECHNOLOGICAL HIGHER EDUCATION NETWORK SOUTH AFRICA
TLPOL	TEACHING AND LEARNING POLICY
TUT	TSHWANE UNIVERSITY OF TECHNOLOGY
UCDG	UNIVERSITY CAPACITY DEVELOPMENT GRANT
VC	VICE-CHANCELLOR
WWIS	WORLD WIDE INFORMATION SERVICES

Foreword By The Vice-Chancellor and Principal



PROF. TINYIKO MALULEKE
VICE-CHANCELLOR AND PRINCIPAL

The University, like many others, experienced challenges including the Covid-19 pandemic, staff and students' mental health, and a declining subsidy from Government. With the lockdown impact that led to empty campuses, connectivity to the internet away from campus for staff and students had to be prioritised to allow for multimodal learning.

In addition to these, a number of Executive Management positions at the Tshwane University of Technology (TUT) were nearing their end of term and new ones were being filled, e.g. the vice rectorate digital transformation was introduced.

In order to reverse the decline in the University's research outputs submitted to the Department of Higher Education and Training (DHET) (318,07 units in 2021 and 334,95 units in 2020), the vice rectorate RIE reviewed all policies with new ones being developed and approved.

Particular attention was given to engaging stakeholders with these policies to allow for creating a more conducive environment for research and postgraduate studies. One indicator of research excellence is the NRF rating system and I congratulate our researchers that have attained, retained and improved their ratings. I am looking forward to soon having the first A-rated researcher at our University.

Amidst all the challenges, the University provided incentives through the recognition of staff who performed well in research in 2020 and 2021 with academic staff who completed their postgraduate studies connected digitally to the event as a result of the Covid-19 pandemic restrictions. A total of 25 researchers were presented with awards at the ceremony.

On behalf of the University, I am grateful to the University Council, staff and students as well as all the funders for their support and understanding during 2021. With staff and students' commitment to the academic project, we aim to reclaim our leading position as a university of technology in terms of research performance in the country.

Overview By The Deputy Vice Chancellor: Research Innovation and Engagement



DR. VATHISWA PAPU-ZAMXAKA
DEPUTY VICE CHANCELLOR
RESEARCH, INNOVATION AND
ENGAGEMENT

In the first part of 2021, the Covid-19 pandemic restrictions were still in place, which affected research activities at TUT. This did not deter researchers and students from continuing to strive for excellence in their research and innovation activities. The number of research chairs increased from 13 in 2020 to 16 in 2021; with the appointment of a Research Chair in Safety and Security and the award of the DBSA Research Chair in Infrastructure and UNESCO Research Chair in innovation.

Funding was also received from the University Council for the establishment of three TUT Research and Development Platforms. The Gibela Research Chair in Manufacturing and Skills Development hosted a fascinating prototype exhibition, a first-of-its-kind exhibition that showcased remarkable prototypes derived from its multi-million rand funded research.

The University enrolled a total of 2384 Master's and Doctoral students in 2021 and hosted 61 postdoctoral research fellows from different parts of the African continent. A total of 338 Master's and Doctoral students graduated. Research grants were received from the National Research Foundation, National Institute of Humanities and Social Sciences, and Department of Higher Education and Training and from various industries. In 2021 we hosted 43 National Research Foundation-rated researchers and that number continues to grow.

Our achievements could not have been possible without the commitment of both our staff and students. Thus, their efforts in continuing to raise the TUT flag high are highly appreciated.

Strategic Overview



5.1. TUT'S VISION

A people's university that makes knowledge work. At TUT, we embrace engaged scholarship whereby learning, teaching, research and engagement is integrated with our everyday realities. Our University is committed towards breaking down the ivory towers of academia by finding authentic and enduring solutions to our communities' most pressing problems. We empower our graduates by future-proofing them to successfully negotiate the rapidly changing world of work and make a tangible movement towards civic renewal.

5.2. TUT'S MISSION

We advance social and economic transformation through relevant curricula, impactful research and engagement, quality learning experiences, dedicated staff and an enabling environment. Our mission directs us towards solving pressing societal problems and ensuring that our graduates are productive and active citizens. Our suite of programmes and qualifications, research and innovation, as well as engagement with stakeholders are aimed at making a positive impact on our communities. We are a committed staff who works tirelessly towards providing a quality service and conducive teaching, learning and living spaces.



5.3. VALUES

Integrity: We will always act honestly, ethically and professionally

Care: We will treat everyone with dignity and respect and green our environment Diversity,

Inclusion and Equity: We will embrace diversity, foster inclusivity and promote equity

Excellence: We will constantly innovate, solve problems and aim to improve ourselves and others

Accountability: We are answerable to each other and will act in the best interest of the university at all times.

5.4. Institutional Pillars and Goals

The University identified four equally important pillars to support our strategy over the next six years. The

DVC: RIE responds to all four pillars, namely:

- Future-ready graduates who make a positive societal impact
- Impactful research, innovation, engagement and technology transfer to foster growth, development and sustainability
- Service and operational excellence through resource optimisation
- Digitally-advanced University.

The pillars are translated into goals and objectives with associated performance indicators. DVC-RIE is responsible for ensuring TUT achieves the following goals:

- Deliver research-informed, high-quality teaching and learning experiences to our students.
- Equip our students with knowledge, skills and attitudes to be enterprising and responsible citizens.
- Engage our students as active participants in their learning experiences.
- Develop our internal capacity and opportunities for creativity, research, innovation, engagement and technology transfer.
- Increase our productivity and impact to advance growth, development and sustainability.
- Deploy agile and efficient processes and structures to ensure sound governance, resource sustainability and effective service delivery.
- Develop and support high-performance teams to foster staff engagement, quality leadership as well as personal and organisational growth.
- Deploy digital and smart technologies to enhance student learning experiences, facilitate knowledge creation, increase engagement and accelerate technology transfer.
- Deploy digital technologies to strengthen our internal capabilities to foster sound University governance and deliver effective services.

The desired outcomes of the Research and Innovation Strategy are underpinned by the need for excellence and sustainability and reflect the challenges that TUT face in terms of Research and Innovation.



The key objectives linked to each goal are summarised below:

- A well-prepared corp of next-generation researchers, postgraduate students and postdoctoral fellows
- Entrepreneurial and innovative studentsEstablished platforms for national and international collaborationsAn enabling environment that will allow researchers to thriveA critical mass of contented research leaders who inspire and mentor others
- The priority areas that provide TUT with a sustained reputation for solution focused, user-inspired research and, where research, teaching and engagement are closely linked.
- A diversified and increased funding for research and innovation
- Effective and efficient governance and management systems.
- An effective and efficient leadership
- The digitalisation of the research environment
- Ensure compliance with governance systems

The responsibility for achieving the above objectives resides with the Deputy Vice-Chancellor: Research, Innovation and Engagement and the Directorate of Research and Innovation, through the Senate Committee for Research and Innovation (SCRI) and Senate Committee for Postgraduate Studies (SCPS), that functioned in accordance with the terms of reference approved by Senate.

The Directorate of Research and Innovation, as the operational unit, had to ensure implementation of strategies in close collaboration with the faculties. Suitable structures had to be in place in order to develop, support and deliver sustainable research activity across the breadth of the University's disciplines in the long term. The retention, recruitment and development of high-quality staff was viewed as the key element in securing sustainable foundations for research.

6. POLICIES GOVERNING RESEARCH, INNOVATION AND ENGAGEMENT

The following table outlines the policies and guidelines governing research, innovation and engagement that were in place in 2020 even though they were taken through the review process:

POLICIES AND TERMS OF REFERENCES				
#	NAMES OF POLICIES	POLICY NUMBER	SENATE APPROVAL DATE	REVIEW DATE
1	Policy on Plagiarism	RIPPOL067	24 June 2016	2019
2	Policy on Participation in national and international conferences locally and abroad	RIEPOL004	November 2021	2024
3	Policy on Research Ethics	RIEPOL003	March 2021	2024
4	Policy on Intellectual Property	RIPPOL007	24 June 2016	2019
5	Policy on Postgraduate Studies	TLPOL024/ PRIPOL001	08 April 2016	2019
6	Policy on commercial research and consulting	RIEPOL011	November 2021	2024
7	Policy on Research Grants and Administration	RIEPOL005	November 2021	2024
8	Policy on Centres and Institutes	RIEPOL008	March 2021	2024
9	Policy on Postdoctoral Fellowships	RIEPOL010	November 2021	2024
	Policy on evaluations of creative outputs and innovations	RIEPOL012	November 2021	2024
10	Terms of Reference of Postdoctoral Committee	-	-	-
11	Terms of Reference of SCPS Meeting	-	-	-
12	Terms of reference of SCRI meeting	-	-	-
13	Terms of reference for Research Ethics	-	-	-

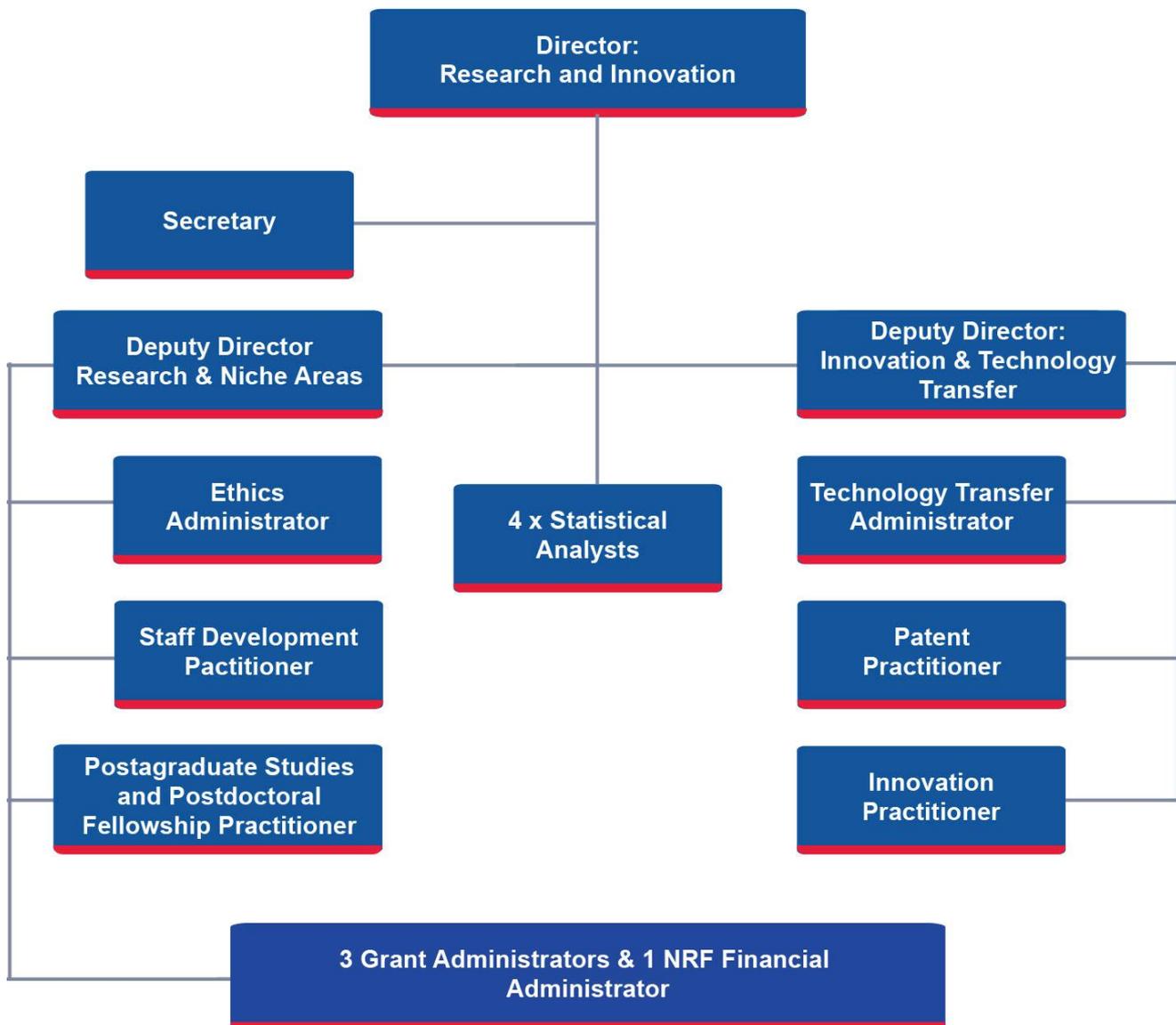
7. ALL ENTITIES REPORTING TO THE VICE-CHANCELLOR

- **Deputy Vice-Chancellor: Research, Innovation & Engagement**
- **Deputy Vice-Chancellor: Student Affairs and Extracurricular Development**
- **Deputy Vice-Chancellor: Teaching, Learning and Technology**
- **Deputy Vice-Chancellor: Digital Transformation**
- **Registrar**
- **Chief Financial Officer**
- **Deputy Vice-Chancellor: Operations**
- **Executive Director: Human Resources and Transformation**
- **Executive Director: Institutional Effectiveness and Technology**
- **Senior Director: Strategic Support**
- **Director: Corporate Affairs and Marketing**

8. STRUCTURE OF THE DIRECTORATE OF RESEARCH AND INNOVATION

The Directorate of Research and Innovation is an operational arm of the Senate Committee for Research and Innovation and reports to the Deputy Vice-Chancellor of Research, Innovation and Engagement (DVC: RIE). The structure comprises the following positions:

- Director of Research and Innovation
- Secretary
- Deputy Director of Research and Niche Areas
- Deputy Director of Innovation & Technology Transfer
- Head of Statistical Support
- Ethics Administrator
- Support Officer: Staff Development
- Support Officer: Postgraduate Studies & Postdoctoral Fellowship
- Support Officer: Research and Niche Areas
- Four Grant Administrators
- Two Statistical Analysts
- Patent Practitioner
- Innovation Practitioner
- Technology Transfer Administrator





PART B: PERFORMANCE INFORMATION



9. POSTGRADUATE STUDIES SUPPORT

The University offers a comprehensive choice of postgraduate programmes across the seven faculties in nine campuses. The campuses are in Tshwane (Arcadia, Arts, Pretoria, Ga-Rankuwa, Soshanguve South and North), eMalahleni, Mbombela and Polokwane.

9.1. Enrolments

It is an expectation of the Department of Higher Education and Training (DHET) for the University to achieve its set annual enrolment targets. For 2021 Master's enrolments, the target was set at 2045 (an increase by 19 from 2026 in 2020) and 470 for Doctoral (a slight increase by seven from 463 in 2020).

<https://flatprofile.com/tut4life-student-email-login/>

For Master's, the University missed the enrolment target by 184 as 1861 Masters students enrolled in 2021 (see Table 3). However, the University surpassed the DHET target of 470 by 53 as a total of 523 students enrolled for Doctoral qualifications in 2021 (Table 3). The fewer number of academic staff to supervise postgraduate students might be one of the challenges associated with this.

Table 3. Postgraduate students' enrolments per faculty per year since 2017

Faculties	Qualification	2017	2018	2019	2020	2021
Economics and Finance	Master's	71	82	107	100	90
	Doctoral	5	1	3	4	4
Engineering and the Built Environment	Master's	297	443	502	508	430
	Doctoral	83	103	103	115	119
Humanities	Master's	337	380	475	517	384
	Doctoral	89	105	111	131	122
ICT	Master's	157	163	164	167	138
	Doctoral	16	27	33	25	25
Management Sciences	Master's	569	575	557	496	462
	Doctoral	65	85	97	112	121
Science	Master's	348	329	339	337	303
	Doctoral	81	121	120	126	125
Arts and Design	Master's	75	77	78	68	54
	Doctoral	13	13	13	13	7
Total	Master's	1854	2049	2222	2193	1861
	Doctoral	352	455	480	526	523
Total Master's and Doctoral		2206	2504	2702	2719	2384

9.2. Graduations

Graduations at both Master's and Doctoral studies decreased in 2021 compared to 2020. The University's DHET target for Master's was 447 and the University did not meet this target as 270 students graduated with Master's qualifications. This is a decrease of 26.6% for Master's qualifications.

<https://www.tut.ac.za/graduations/virtual-ceremonygraduation>, as compared to 2020.

The Doctoral graduation target which was set at 67 was exceeded, as the University graduated 68 students with Doctoral qualifications (Table 4). Measures were implemented to ensure continuous improvement with regards to the number of students attaining their qualifications and these interventions will assist our students to complete their studies on time.

9.3. Workshops offered to postgraduate students

In order to respond and align to the TUT ISP 2020-2025 Strategic Pillar 1: Future-ready graduates who make a positive societal impact, the Directorate of Research and Innovation offered research capacity building training presented in Table 5 below. All training courses were offered virtually due to the Covid-19 pandemic restrictions.

Activity	Date of training	Facilitators
Navigating Your Dissertation/Thesis Journey - Conceptualising the Research, Proposal Writing/Academic	22 April 2021	Prof R Rugimbana
Free Publishing Webinar: How to Get Published in an Academic Journal Wiley Author Workshop	14 April 2021	External service provider, Wiley Authors
Technical Writing-The making of an Astute and Consummate Researcher	5 May 2021	Prof R Sadiku
Turnitin Training (for supervisors and librarians)	25 May 2021	Mr G Uys from Eiffelcorp
SPSS Training: 1) The usage of Statistical Package for the Social Sciences (SPSS) Training 2) Statistical Package for the Social Sciences (SPSS) Training: Questionnaire Design.	9-10 June 2021	Mr V Maduna
Research Ethics training for Postgraduate students	15 October 2021	Dr H Mason
Research Ethics training for Postgraduate students	12 November 2021	Dr H Mason

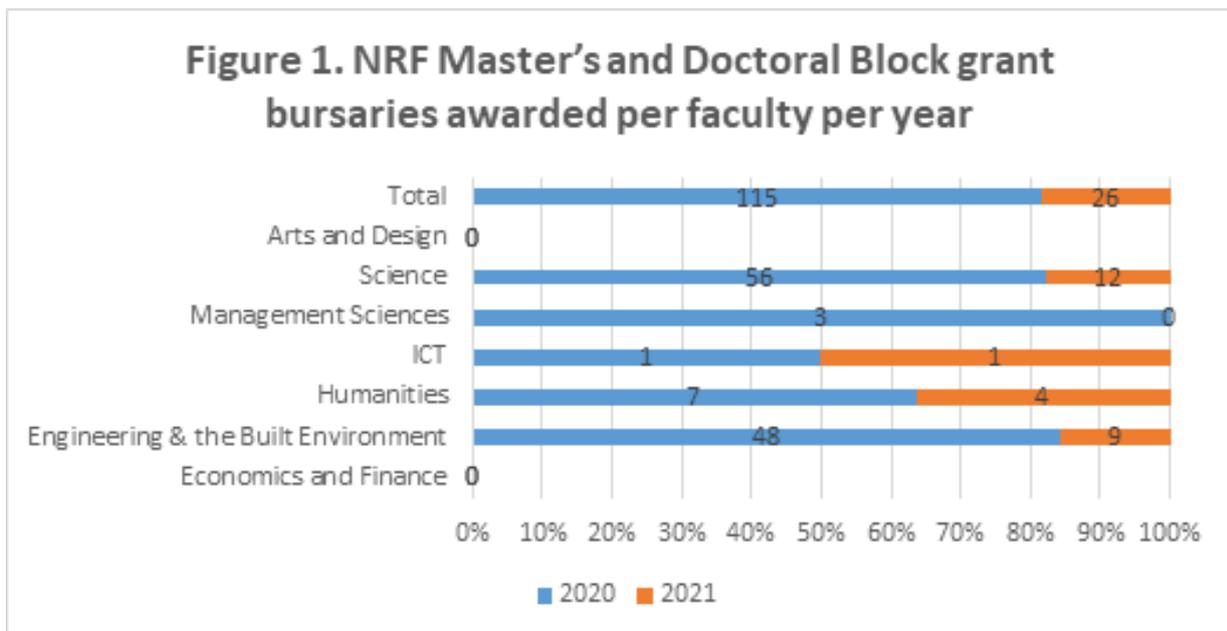
9.4. Funding support for students and postdoctoral fellows

The Directorate of Research and Innovation is responsible for identifying funding opportunities and availing institutional resources for its postgraduate students. In the sections below, the number of scholarships from the National Research Foundation and University are reported. The University received 26 Block grant bursaries from the NRF to support unemployed full-time Master's and Doctoral students registered in 2021 as shown in Table 6 and Figure 1 below.

The faculties of Science and Engineering and the Built Environment benefitted from the majority of the allocated bursaries. In 2021, the decline may have been caused by the 2020 funded students completing their qualifications, reached maximum support from the NRF and also the NRF discontinued block grants intake of new applications and all new applicants were to apply directly through the NRF system.

Table 6. NRF Master's and Doctoral Block grant bursaries awarded per faculty per year

Faculty	2020	2021
Economics and Finance	0	0
Engineering & the Built Environment	48	9
Humanities	7	4
ICT	1	1
Management Sciences	3	0
Science	56	12
Arts and Design	0	0
Total	115	26



In addition to the awarded Master's and Doctoral block grants, the University also received freestanding scholarships for Master's and Doctoral studies. The total awarded scholarships is to the value of R11 790 714 and Postdoctoral Research Fellowships valued at R305 000. The faculties of Science and Engineering and the Built Environment received the most scholarships for their students as indicated in Table 7 below. This is a decline from the previous year as the values of scholarships and fellowships in 2020 were R16 408 735 and R1 525 000, respectively.

In 2021, two reasons led to the decline of the NRF awarded Scholarships (1) NRF stopped funding the BTech programme (2) Freestanding (partial and full costs model) scholarship for the Master's and Doctoral claim conditions were introduced and this affected the value of the award. With regards to the Postdoctoral Research Fellows, some concluded their fellowship in 2020 and some received full time employment.

Table 7. NRF funding for Scholarships and Postdoctoral Fellowship

Faculty	NRF Scholarships	Postdoctoral Fellowship	Grand Total
	Master's, Doctoral		
Arts and Design	R90 000	R0	R90 000
Economics and Finance	R257 000	R0	R257 000
Engineering & the Built Environment	R2 786 714	R305 000	R3 091 714
Humanities	R585 000	R0	R585 000
ICT	R120 000	R0	R120 000
Management Sciences	R357 000	R0	R357 000
Science	R7 595 000	R0	R7 595 000
Grand Total	R11 790 714	R305 000	R12 095 714

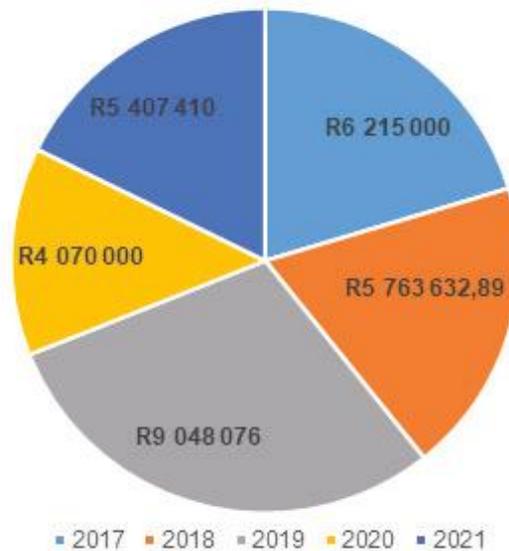
In 2019, the Senate Committee for Research and Innovation made funding available for scholarships for full-time registered postgraduate students amounting to R9 million. A total of R4,07 million of the initial allocation was spent in 2020 and R5,05 million in 2019. Table 8 and Figure 2 presents the faculty expenditure reports following the distribution of funds according to research outputs performance during the subsidy year. The faculties of Engineering and the Built Environment, Science, Humanities and Management Sciences distributed the most funds to the students.

Table 8. TUT Scholarships per faculty since 2017

Faculty	2017	2018	2019	2020	2021
Economics and Finance	R200 000	R65 252.06	R120 000	R0.00	
Engineering and the Built Environment	R2 480 000	R2 040 000	R3 370 000	R2 000 000	R 2 180 000
Humanities	R1 410 000	R1 410 000	R1 660 000	R140 000	
ICT	R240 000	R50 000	R489 206	R180 000	R 215 000
Management Sciences	R590 000	R920 370	R1 220 000	R500 000	R 1 195 000
Science	R1 145 000	R828 010.83	R1 708 870	R1 160 000	R 1 687 410
Arts and Design	R200 000	R450 000	R480 000	R90 000	R130 000
Total	R6 215 000	R5 763 632.89	R9 048 076	R4 070 000	R 5 407 410

Table 8 indicates the awarded scholarships since 2017, and it is important to note that although the country was in hard lockdown (2020 and 2021) due to the Covid-19 global pandemic, some students were able to continue with their studies and were supported with scholarships. Some students suspended their studies during this period whilst the students who continued with their studies were restricted from collecting their data and this led to some of them postponing their studies.

Figure 2. Total TUT scholarships awarded since 2017



Internship

The Human Sciences Research Council (HSRC) in partnership with the Department of Science and Innovation (DSI) has initiated an internship programme in which unemployed Science, Engineering and Technology (SET), Research, Development and Innovation, Social Sciences and Humanities graduates and postgraduates, are afforded an opportunity to acquire practical work experience and improve their competencies through mentoring and an exposure to a research environment for a period of two years. Internship opportunities are also offered to successful candidates to gain experience in the Research, Development, and Innovation sector in various positions that include management, support, and administration at qualifying institutions.

The University hosted 13 interns in 2021 (11 DSI-HSRC and two DTIC) (Table 9). One intern completed the tenure of the internship and 12 are continuing with the programme.

Table 9. Interns hosted at TUT for the 2020/2021 period

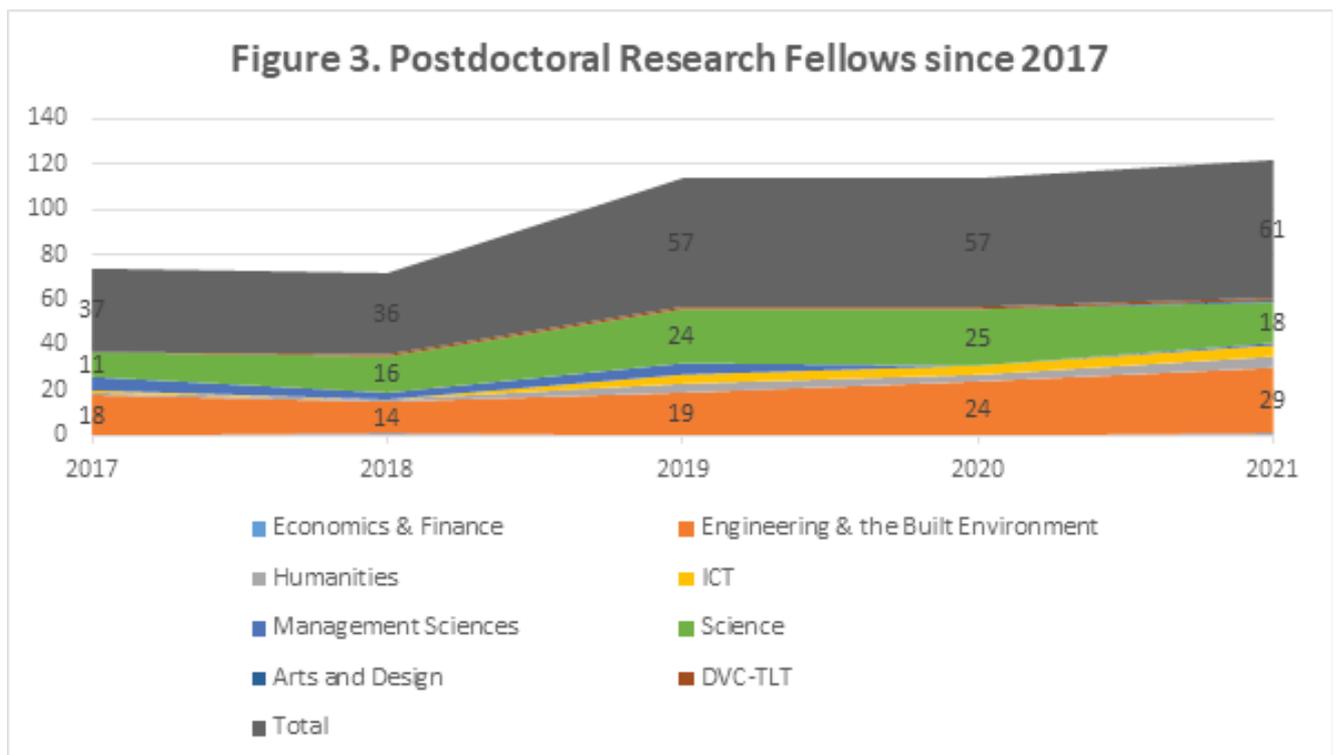
Names	Host	Campus/Place	Funder
Miss IKR Leotlela	Dr RM Raseleka	Pretoria	DSI-HSRC
Miss NG Ngulube	Ms I Newport	Arts and Design	DSI-HSRC
Mr O Legwase	Prof N Moodley-Diar	Arts and Design	DSI-HSRC
Miss MC Rakgwale	Dr M Ramakokovhu	Pretoria	DSI-HSRC
Miss P Mnisi	Ms M Ngope	Soshanguve	DSI-HSRC
Miss ZS Mkize	Dr H Mphidi	Pretoria	DSI-HSRC
Mr KK Phiri	Dr M Hlongwane	Pretoria	DSI-HSRC
Mr S Mbanguta	Dr M Zerihun	Ga-Rankuwa	DSI-HSRC
Mr KP Nkadimeng	Mr I Tlhabadira	Ditsela Place	DSI-HSRC
Mr V Mhlongo	Dr N Skosana	Soshanguve	DSI-HSRC
Miss MP Sithole	Prof E Rankhumise	Pretoria	DSI-HSRC
Miss P Mohlahla	Dr H Mphidi	Pretoria	DTIC
Mr M Machete	Dr H Mphidi	Pretoria	DTIC

Postdoctoral research fellowship

In order to continue strengthening the University's Internationalisation and Africa Engagement agenda and increasing the number of research outputs for TUT, a total of 61 Postdoctoral Research Fellows from various African countries were hosted in 2021. Of these fellows, 49 were males and 12 females. The fellows were funded by various funding programmes including the National Research Foundation, Gibela, and TUT through the Senate Committee for Research and Innovation (SCRI). It is pleasing to report an increase in the number of fellows hosted at TUT in 2021 compared to 2020 as described in Table 10 and Figure 3 below and that 17 fellows were South Africans.

Table 10. Postdoctoral research fellows since 2017

Faculty	2017	2018	2019	2020	2021
Economics and Finance	0	1	0	0	1
Engineering and the Built Environment	18	14	19	24	29
Humanities	1	1	4	3	5
ICT	1	0	4	4	5
Management Sciences	6	3	5	0	1
Science	11	16	24	25	18
Arts and Design	0	0	0	0	1
DVC-TLT	0	1	1	1	1
Total	37	36	57	57	61





10. Research Support

The partnership with faculties through Faculty Research Officers and Assistant Deans for Research and Innovation continued in 2021. The following sections provide the details on how TUT research advanced in 2021 compared to previous years (this includes the external funded research chairs, niche areas, centres institutes technology stations and incubators (CITSIs) and rated researchers).

10.1 Research Capacity

According to the DHET agreed upon targets, the University was expected to have had 556 (47%) academic staff with Master's and 353 (30%) with Doctoral qualifications in 2021. Even though there has mostly been a continuous upward trajectory in the number of staff members with Master's and Doctoral degrees over the past five years, it remains a challenge for the University to meet the DHET targets.

A total number of 408 academic staff members held Master's degrees in 2021, which is a slight decrease from 410 in 2020. The most significant Master's degrees increase was in the Faculty of Science with 10 staff members, followed by the Faculty of Economics and Finance with three members and the Faculty of Arts and Design with two staff members. The remaining four faculties decreased in the number of staff members with Master's degrees.

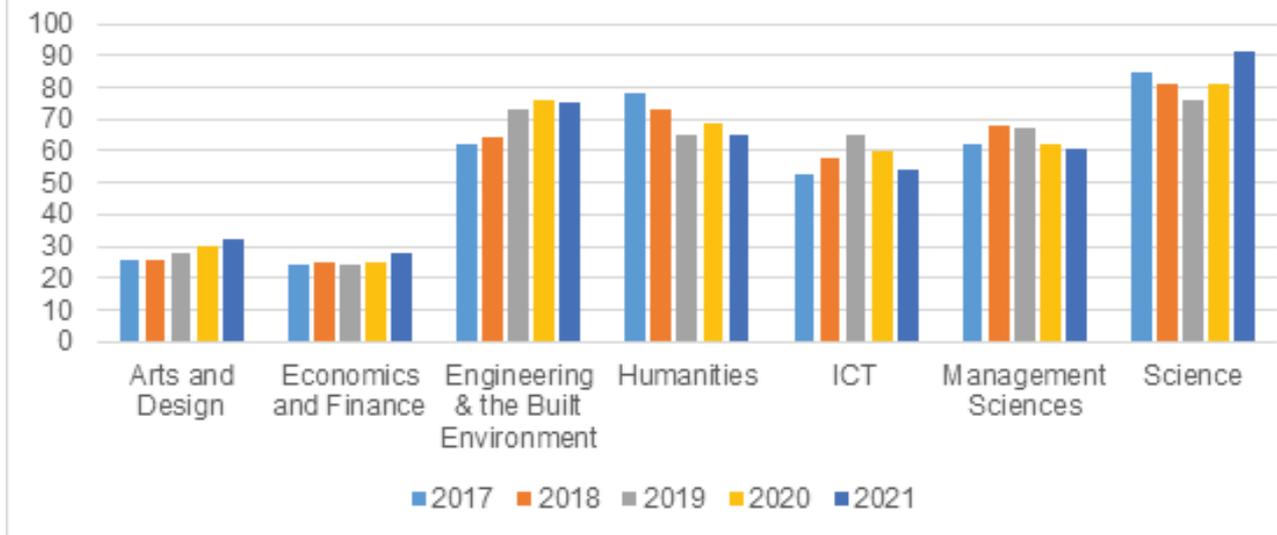
The number of academic staff members with Doctoral degrees increased from 311 in 2020 to 319 in 2021. As shown in Table 11 below, the Faculty of Engineering and the Built Environment had an increase of seven staff members with Doctoral degrees, followed by the faculties of Arts and Design, and Information and Communication Technology with four staff members each. The Faculty of Science increased with one staff member, and the Faculty of Management Sciences remained on the same number as in 2020. In the Directorate of Higher Education Development and Support, there were three staff members with academic appointments. One of these staff members has a Doctoral qualification, and two staff members have Master's qualifications. There were 57 academic staff members with postgraduate qualifications (not Master's or Doctorate degrees), and 97 academic staff members with undergraduate qualifications. In total, there were 881 academic staff members employed in 2021.

Table 11. Academic staff with postgraduate qualifications per faculty*

Faculty	Qualification	2017	2018	2019	2020	2021
Arts and Design	M	26	26	28	30	32
	D	17	15	15	13	17
Economics and Finance	M	24	25	24	25	28
	D	13	10	9	10	9
Engineering and the Built Environment	M	62	64	73	76	75
	D	43	44	45	45	52
Humanities	M	78	73	65	69	65
	D	55	56	56	59	54
ICT	M	53	58	65	60	54
	D	11	17	20	17	21
Management Sciences	M	62	68	67	62	61
	D	46	53	62	61	61
Science	M	85	81	76	81	91
	D	88	100	107	103	104
Higher Education Development and Support	M					2
	D					1
Total Master's	M	390	395	398	410	408
Total Doctoral	D	273	295	317	311	319
Total capacity		663	690	715	721	727

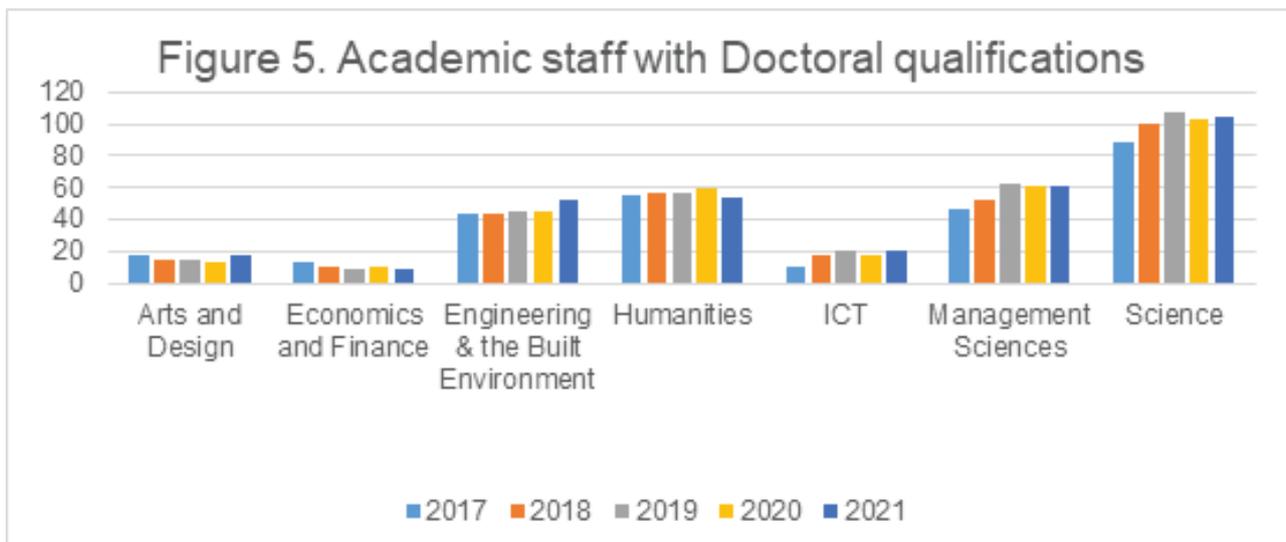
*Preliminary report based on operational data for 2021, received in January 2022 from the Directorate: Strategic Management Support

Figure 4. Academic staff with Master's qualifications



Academic staff members with Master's qualifications

Figure 5. Academic staff with Doctoral qualifications

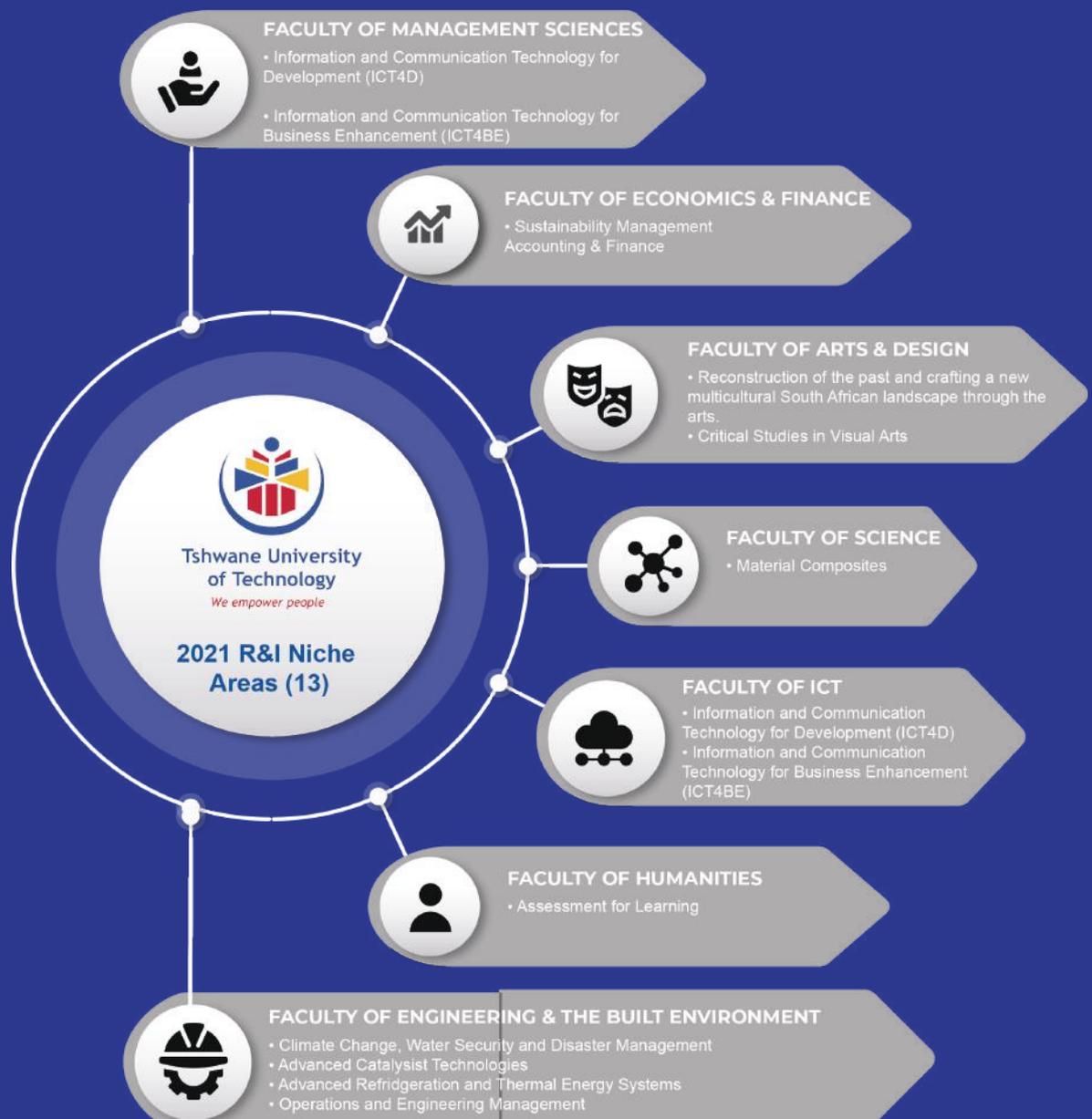


Academic staff members with Doctoral qualifications

The number of academic staff members with Doctoral degrees increased from 311 in 2020 to 319 in 2021.

10.2. Research and Innovation niche areas

The Niche Areas promote innovative research for the economic development of the country. A Niche Area has a well-defined research theme and should move through a development trajectory and strive to develop up to the stage where they become Centres or Chairs. TUT had 13 active Research Niche Areas in 2021 as reported in Figure 1. Of these, two were in the Faculty of Management Sciences, one at the Faculty of Science, four at the Faculty of Engineering and the Built Environment, two at the Faculty of Information and Communication Technology, two at the Faculty of Arts and Design, one at the Faculty of Humanities and one at the Faculty of Economics and Finance. Two Research Niche Area leaders were female.



Research Chairs

According to the Department of Science and Innovation (DSI) - National Research Foundation (NRF) South African Research Chair Initiative (SARChI) guidelines, the SARChIs Chairs are selected based on their research expertise and ratings. The main goal of the Research Chair programme is to strengthen and improve research and innovation capacity of public universities for producing high quality postgraduate students, research and innovation outputs and to increase the production of Master's and Doctoral graduates.

The University had 16 Research Chairs in 2021 (Figure 2), nine of which were funded by DSI-NRF SARChIs. The other Research Chairs were funded by Gibela (one), MerSETA (one), MICT SETA (one), EWSETA (one), DBSA Infrastructure Research Chair (one), African Research Chair for the Campus and School Public Safety (one). The University also had one internally funded UNESCO Chair. Of the 16 Research Chairs, three were awarded in 2021; the UNESCO Research Chair in Innovation, the DBSA Infrastructure Research Chair and the African Research Chair for the Campus and School Safety. Three of the Research Chairs hosted at TUT were females.

FACULTY OF SCIENCE

- DSI-NRF SARChI: Acid Mine Drainage
- DSI-NRF SARChI: Phytochemical Food Network to Improve Nutritional Quality for Consumers
- DSI-NRF SARChI: Agrochemurgy and Plant Symbioses
- DSI-NRF SARChI: Water Quality and Wastewater Management
- DSI-NRF SARChI: Phytomedicine

FACULTY OF INFORMATION, COMMUNICATION & TECHNOLOGY

- MICT SETA: 4th Industrial Revolution

FACULTY OF HUMANITIES

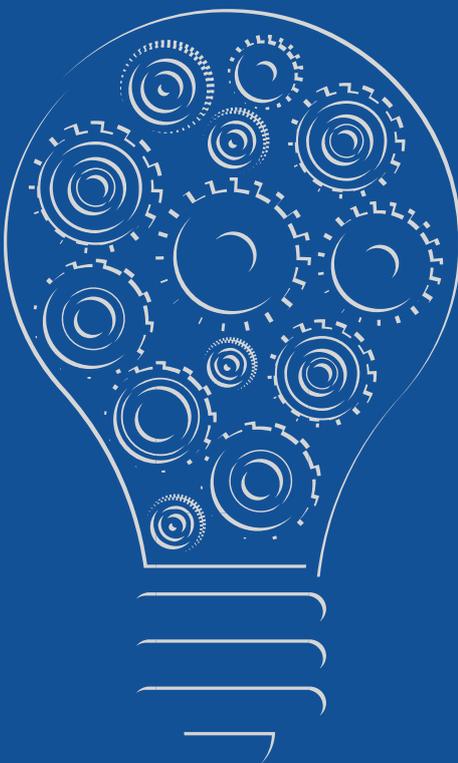
- African Research Chair for the Campus and School Public Safety

FACULTY OF ARTS AND DESIGN

- UNESCO: Cultural Policy and Sustainable Development

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

- DSI-NRF SARChI: Innovation Studies
- DSI-NRF SARChI: Enabled Environment and Assistive Living
- DSI-NRF SARChI: Spatial Transformation (Positive Change in the Built Environment)
- DSI-NRF SARChI: Future Transport Manufacturing Technologies
- Gibela: Manufacturing and Skills Development
- MerSETA: Intelligent Manufacturing
- EWSETA: Wastewater and Solid Waste Management
- DBSA Infrastructure Research Chair





NRF Rated Researchers

Similarly to 2019, a total number of 43 academics at TUT were NRF rated in 2020 as shown in Table 12. Only seven of the rated researchers were female, which is 17% of the total number. Most rated researchers are situated in the Faculty of Science followed by Engineering and the Built Environment. This has been the trend over the years and confirms that the strength of the institution in terms of research lies in the two faculties, namely Science and Engineering and the Built Environment. Details of rated researchers' specialisation at TUT in 2020 are presented in Table 13 below.

Table 12. Number of NRF rated researchers per faculty

Faculty	2017	2018	2019	2020	2021
Arts and Design	3	3	2	2	3
Economics and Finance	1	1	0	0	1
Engineering and the Built Environment	12	14	12	12	12
ICT	2	3	1	1	1
Management Sciences	3	1	1	1	1
Sciences	26	26	24	25	22
Humanities	0	0	0	0	1
Non Faculties	0	1	2	1	2
Total	47	49	42	43	43

Table 13. NRF rated researchers per specialisation and category of rating

Faculty of Engineering and the Built Environment		
Researcher	Rating	Specialisation
Dr AB Akuru	Promising young researcher	Finite Element Analysis; Design optimization; Renewable Energy; Wind Energy Conversion Systems; Electric machines
Dr DA Desai	Established researcher	Heat transfer; Fatigue; Materials processing; Laser materials processing; Vibrations; Sound engineering; Structural dynamics; Material characterisation
Prof KDA Djouani	Established researcher	Robotics; Optimisation; Advanced control methods; Soft computing; Applied Artificial Intelligence; Advanced wireless communication; Mobile cloud computing
Prof S Du	Established researcher	Mechanical systems modelling; Control of mechatronic systems; Brain-computer interfacing; Control systems; Computer vision; Pattern recognition; Network analysis; Image processing
Dr W Mhike	Promising young researcher	Polymer nanocomposites; Polymer composites; Polymer processing; Polymers - Flammability; Energy storage materials; Electrical properties of polymers and polymer composites
Prof K Mpofo	Established researcher	Industrial robotics; Reconfigurable and emerging manufacturing systems; Advanced manufacturing; Expert systems (Computer science); Robotics; Additive manufacturing
Prof TO Olwal	Promising young researcher	Industrial wireless sensor networks; Broadband wireless multimedia communication; Wireless telecommunication networks; Constrained optimisation; Software defined radio - Wireless technology; Telecommunication networks; Telecommunications; Wireless cellular systems; New generation wireless access technologies; Foraging ecology/behaviour
Prof MS Onyango	Established researcher	Adsorption; Hazardous wastes; Wastewater treatment; Water treatment; Nanotechnology;

Prof AOS Osman	Established researcher	African modernism; Architectural historians; Architectural theory; Architectural design and Construction; Informal housing; Housing; Architecture; Architectural education; Open building principles; Architectural interpretation
Prof ER Sadiku	Established researcher	Biopolymer composites, Biopolymer blends, Polymer physics
Prof J Snyman	Established researcher	Water resources and environmental engineering; Solid waste management; Applied hydrology; Civil engineering hydraulics; Geohydrological modelling; Engineering hydrology; Climate change; Biogas from solid waste; Civil engineering - Wastewater; Municipal Solid Waste to Energy
Prof GS Steyn	Established researcher	Applied research; African history
Faculty of Information and Communication Technology		
Researcher	Rating	Specialisation
Dr M Lall	Established researcher	Machine learning; Data science; Computer software - Agents; Wireless; Information security; Communication networks
Faculty of Economics and Finance		
Researcher	Rating	Specialisation
Prof GP Coetzee	Established researcher	Corporate governance, risk management and internal auditing
Faculty of Humanities		
Researcher	Rating	Specialisation
Dr T de Jager	Established researcher	Pedagogy and Education; Pedagogy in Higher education; First Year Student Experience
Faculty of Management Sciences		
Researcher	Rating	Specialisation
Dr UP Hermann	Promising young researcher	Heritage and cultural Tourism, Heritage - Management, Tourism and the heritage , National parks and reserves - Tourism , Events - Management, Mega events

Faculty of Science		
Researcher	Rating	Specialisation
Dr WA Augustyn	Established researcher	Plant metabolomics; High Performance Liquid Chromatography; Gas chromatography; Chemometrics; Host-plant resistance; Insect pests - Control
Prof S Combrinck	Established researcher	Fruits - Postharvest technology; Essential oils; Vibrational spectroscopy; Ethnopharmacology; Chromatography; Chemometrics; Quality control
Prof FD Dakora	Internationally acclaimed researcher	Soil science; Biological nitrogen fixation; Applied microbiology; Plant physiology; Rhizobia
Prof I Fedotov	Established researcher	Applied mathematics; PDEs, Biomath, Numerical Analysis
Prof SV Joubert	Established researcher	Sound and vibration, Mathematics education - Computer-assisted instruction, Elasticity theory, Applied mechanics, Acoustics, Algebra, Biomathematics, Ordinary differential equations - Numerical methods, Computational physics education, Partial differential equations
Prof GP Kamatou Pougoue	Promising young researcher	Multivariate analysis; Quality control; Bioanalytical chemistry; Ethnobotany; High Performance Liquid Chromatography; Gas chromatography; Essential oils analysis; Essential oils - Biological activity; Two-dimensional gas chromatography; Antimicrobial compound - Isolation and characterisation
Prof DRP Katerere	Established researcher	Pharmaceutical sciences; Mycotoxicology; Regulatory Sciences
Prof RI McCrindle	Established researcher	Analytical atomic spectroscopy; Water pollution; Acid mine drainage pollution; Aquatic environments
Prof MNB Momba	Established researcher	Wastewater bioremediation; Wastewater re-use; Nanotechnology; Health related water microbiology; Wastewater treatment; Drinking

		- Drinking water; Environmental biotechnology; Groundwater contamination; Industrial wastewater; Industrial water management
Prof SP Moshokoa	Established researcher	Analysis, Asymmetric topology
Prof M Msimanga	Promising young researcher	Condensed Matter Physics and Advanced Nanotechnology; Ion beam analysis; Thin film fabrication; Radiation and matter physics; Ion beam modification of materials
Dr BJ Mtileni	Promising young researcher	Animal Breeding and Genetics
Prof TL Nedambale	Established researcher	Animal reproduction physiology; Animal reproduction - Assisted; Animal biotechnology
Prof KA Nephawe	Established researcher	Animals - Research; Animal biotechnology; Animal production economics; Animal genetics; Animal breeding; Animal behaviour; Animal Breeding and Genetics; Animal production
Prof OJ Okonkwo	Established researcher	Water pollution; Waste management; Heavy metal polluted soils; Indoor air pollution; Gas chromatography; Carbon nanotubes; Analytical environmental chemistry; Persistent organic pollutants; Adsorption technology ; Ecotoxicology of soil and water
Prof TJC Regnier	Established researcher	Natural products from plants; Microbiology; Food safety and technology; Chromatography
Prof LJ Shai	Established researcher	Biochemistry; Phytochemistry; Applied microbiology
Prof M Shatalov	Established researcher	System identification
Prof D Sivakumar	Established researcher	Fruit technology; Fruit quality; Postharvest physiology; Postharvest biology and technology; Phytochemicals; Postharvest

Prof AL Toriola	Established researcher	Sport Sciences; Physical Education; Physical Activity and Health; Physical Growth and Development; Kinanthropometry; Physical activity and health
Prof AM Viljoen	Internationally acclaimed researcher	Metabolomics; Essential oils; Vibrational spectroscopy; Herbal medicine; Chromatography; Chemometrics; Analytical chemistry - Quality assurance
Prof C Wolkersdorfer	Established researcher	Geothermal energy; Mining - Environment; Hydrodynamics; Hydrogeology; Tracers; Engineering geology; Environmental geology; Geoarchaeology; Hydrogeochemistry
Faculty of Arts and Design		
Researcher	Rating	Specialisation
Dr A Jansen van Vuuren	Promising young researcher	Afrikaans Film; South African Cinema; Screenwriting; Film studies; Creative writing; Journalism and media studies; Media representation; African film
Prof NG Mugovhani	Established researcher	Musicology; Musicology; African music; Choral music; Composition (Indigenous music); Composers, African music; Community Music; African Music Performance
Prof HM Sirayi	Established researcher	African culture; Arts management; African theatre; South African drama
Directorate of Higher Education Development Support		
Specialisation	Specialisation	Specialisation
Dr HD Mason	Promising young researcher	Meaning (Psychology); Burn out (Psychology); Positive psychology; Student academic development; Higher education - First-year experience and student success
Deputy Vice Chancellor: Teaching, Learning and Technology		
Specialisation	Specialisation	Specialisation
Prof BJ van Wyk	Established researcher	Pattern recognition and image processing; Algorithms for optimisation; Stochastic methods



Staff Development

The Directorate of Research and Innovation encourages researchers to apply individually to external funding sources (e.g. the NRF, EU programmes, etc.) for improvement of qualifications at postgraduate level. The sections below present support provided to all researchers (researchers in training, emerging and established researchers).



NRF Thuthuka Awards

In 2021, 15 researchers received financial support from the NRF Thuthuka programme as presented in Table 14 below. This is an increase by two awards from 2020. The Faculty of Science received 12 awards and the Faculty of Engineering and the Built Environment had three awards. Eleven of these grant holders were TUT female academics, which is 73% of the total awardees. Three grant holders were supported under the rating track, two under the PhD track, and 10 under the post-PhD track. Upon completion of their studies and rating track funding cycles, these staff members will increase the number of academics with Doctoral degrees and NRF rating.

Table 14. Academics awarded NRF Thuthuka Grants in 2021

Name	Gender	Ethnicity	Track	Faculty	Status
Bester DM	Male	White	PhD	Engineering and the Built Environment	Continuation
Du Plessis B	Female	White	Post-PhD	Science	Continuation
Hlongwane MM	Female	Black	PhD	Science	Continuation
Mabena LF	Female	Black	Post-PhD	Science	New
Makgopa K	Male	Black	Post-PhD	Science	Continuation
Manicum A-L	Female	Coloured	Post-PhD	Science	Continuation
Maphoru MV	Female	Black	Post-PhD	Science	Continuation
Marnewick K-A	Female	White	Post-PhD	Science	New
Mashigo MF	Female	Black	Post-PhD	Science	New
Melato FA	Female	Black	Post-PhD	Science	New
Nangammbi TC	Female	Black	Post-PhD	Science	Continuation
Shongwe MB	Male	Black	Rating	Engineering and the Built Environment	Continuation
Tarirai C	Male	Black	Rating	Science	Continuation
Teffo ML	Female	Black	Post-PhD	Engineering and the Built Environment	New
Tembu VJ	Female	Black	Rating	Science	Continuation

The THENSA PhD Capacity Enhancement Programme for staff (focusing on previously disadvantaged and Black women in particular) is a decisive response to the challenges with regard to the recruitment, support and retaining of Black and particularly female academic staff to address their under-representation at all levels in the higher education sector. Over the three-year period, nine TUT staff members (see Table 15 below) were part of the 50 PhD candidates from different SA HEI who were supported through various modules until the examination of their theses. Module 5b was concluded in 2021 via remote/online platforms. The Programme has introduced various interventions to assist participants, i.e. Weekly Guidance (literature to assist with the research process); sit tight and write sessions (dedicated and uninterrupted time to focus on the research while being 'supervised'); and One-on-one meetings (providing academic coaching and advice on writing up).

Table 15. THENSA PhD Capacity Enhancement Programme candidates

Surname & Initials	Gender	Ethnicity	Faculty
Matome TB	Female	Black	Arts and Design
Mathonsi XS	Female	Black	Economics and Finance
Mapundu Z	Male	Black	ICT
Meyer SA	Female	Coloured	Management Sciences
Hlongwane MM	Female	Black	Science
Mtshali K	Female	Black	Science
Nobela HN	Female	Black	Science
Shingange-Ralushai MP	Female	Black	Science
Mabote NE	Female	Black	Directorate of Quality Promotion

NRF Black Academic Advancement Programme (BAAP) in 2021

There were 10 candidates who received sabbatical grants under the NRF Black Academic Advancement Programme (BAAP) in 2021. Of these, six (four under Doctoral and two Postdoctoral programmes) were new candidates and two renewals under the Doctoral Programme, one renewal under the Postdoctoral Programme and one upgraded from Doctoral to Postdoctoral Programme as indicated in Table 16 below.

Table 16. Staff awarded NRF BAAP sabbatical grants in 2021

Surname & Initials	Gender	Ethnicity	Period	Faculty	Status
Khosa D	Female	Black	12 Months, Postdoctoral	Humanities	New
Makopo BM	Female	Black	12 Months, PhD	Management Sciences	New
Malatji N	Male	Black	12 Months, PhD	Engineering and the Built Environment	Continuation
Manicum A-L	Female	Coloured	12 Months, Postdoctoral	Science	New
Mapundu Z	Male	Black	12 Months, PhD	ICT	New
Mogase RC	Female	Black	12 Months, PhD	ICT	Continuation
Moses RH	Male	Indian	12 Months, Postdoctoral	Arts and Design	Continuation
Nobela HN	Female	Black	12 Months, PhD	Science	New
Phuluwa HS	Male	Black	12 Months, PhD	Engineering and the Built Environment	New
Segooa MA	Female	Black	12 Months, Postdoctoral	ICT	Upgrade

DHET Future Professors Programme Phase 1



Dr K Makgopa, a lecturer from the Department of Chemistry in the Faculty of Science became the first staff member to successfully apply to participate in the first of cohort of the DHET Future Professors Programme.

According to the reviewers, “the process of selection was both rigorous and highly competitive in producing the cohort for this prestige initiative by the Department of Higher Education and Training to invest in the future South African professoriate”. “It should be emphasized that the quality of nominations received from all 26 universities was exceptional. The programme seeks to build the 29 selected candidates into a strong and cohesive college of future South African scholars”.

Staff improved qualifications

During 2021, there were 64 permanent staff members who improved their qualifications. Of these, six obtained MBA degrees. Thirty-two staff members obtained their Master’s degrees, which is a 30% increase from the 25 staff members in 2020. Eighteen of the 32 staff members are in academic departments. Twenty-six staff members obtained their Doctoral degrees, which is a 20% increase from the 22 in 2020, and 21 of these are in academic departments. In the Doctoral degree category,

the Faculty of Information and Communication Technology led by six graduates; followed by the Faculty of Arts and Design with four graduates; three each in the faculties of Engineering and the Built Environment, and Humanities; two each in the faculties of Management Sciences, and Science; and one in the Faculty of Economics and Finance. The Directorate of Higher Education Development Support had two staff members who obtained their Doctorates; and the Directorate of Library and Information Services, Planning and Coordination, and Student Affairs and Extra Curricula Activities each had one staff member who obtained a Doctoral degree.

Table 17. Number of staff who graduated with postgraduate qualifications in 2021

Faculty/Directorate/Unit	Initials, Surname	MBA	Master's	Doctoral
Arts and Design	WT Mgcodo		3	
	K Khiba			
	KM Mashilo			
	L Orlandi			4
	P Sidogi			
	S Mbatha			
	RA Lepere			
Economics and Finance	KSC Kobedi		2	
	BC Mashaba			
	AH Legodi			1
Engineering and the Built Environment	CJ Khumalo		4	
	PM Sekatane			
	D Mokwele			
	S Hlungulu			
	MJ Stander			3
	ME Migabo			
	ML Teffo			
Humanities	SM Khumalo		1	
	M Muushathoni			3
	YLP Majola			
	MT Mbatha			
Information and Communication Technology	ST Leholo		2	
	NV Ranko			
	MR Kgasi	1		
	AAK Buitedag			6
	MA Segooa			
	RT Hans			
	MP Matseoane			
	SP Mamorobela			
	CH Kgoetiane			
Management Sciences	AF Maluleke		1	
	JR Roberson	1		
	PL Snyman			2
	QEM Mangwane			

Science	TAN Kaye RP Kganyago PI Boshof LG Maguga S Ngcobo		5	
	MP Mokgotho RC Moropeng			2
Higher Education Development and Support	JH Mphurpi A Craven T Mangena		3	
	S Dockrat	1		
	MG Chweu LK Kgwete			2
Human Resources and Transformation	TC Masenamela	1		
Finance	MB Maseko	1		
Library and Information Services	MC Mashaba		1	
	RS Mhinga			1
ICT Services	TL Nkosi		1	
Office of the DVC: Teaching and Learning	D Mokua	1		
Office of the Vice- Chancellor and Principal	R Tshisikhawe		1	
Operations	STI Mabaso R Matentshi		2	
Planning and Co- ordination	VM Mokwena WS Langa		2	
	MJ Pieterse			1
Student Administration	MS Maringa		1	
Student Affairs and Extra Curricula Activities	V Malatse AE Mudau CD Moatshe-Mushi		3	
	GM Xaba			1
Total		6	32	26

Training for researchers

The Department of Higher of Education and Training (DHET)'s University Capacity Development Grants (UCDG)'s purpose is to provide financial assistance to Universities for the development of employees' research skills. The approved TUT decentralised management system allowed faculties to manage their project funds through the Office of the UCDG Manager under the auspices of the DVC: Teaching, Learning and Technology.

The workshops presented in Table 18 below aimed to equip researchers (those in training, emerging and established) with generic research skills needed to do research and supervise postgraduate students successfully. Eleven of the workshops covering six topics were conducted in-house, and the Introduction to Research Ethics workshop was compulsory for all Research Ethics Committee members including Faculty Committee members. Five workshops covering three topics were facilitated by external presenters. The number of staff members who completed the training are indicated in Table 18 below.

Table 18. Research Capacity Development Programmes

	Programme	Presenter	Staff attendance
1	How to prepare a successful paper	Springer	19
2	Research Ethics: Introduction (3 workshops)	Dr HD Mason	46
3	Research Ethics: Advanced I (3 workshops)	Dr HD Mason	39
4	Research Ethics: Advanced II (2 workshops)	Dr HD Mason	25
5	Academic writing: Proposal/Thesis/Dissertation	Prof R Rugimbana	26
6	Technical writing: Proposal/Thesis/Dissertation	Prof ER Sadiku	37
7	Technical writing: Publications	Prof ER Sadiku	21
8	Resilience workshops (2 workshops)	CCI (Pty) Ltd	23
9	Empowering methodologies in academic research and writing papers (2 workshops)	WWIS	14
	Total		250

Research Outputs

As a measure of research performance nationally and internationally, the University contributes to the new knowledge generation and disseminate some of the outcomes of research in the Department of Higher Education and Training (DHET) subsidised journals. In this way, research income is generated for the University to continue with its research development support. Over the past three years, there has been a decline in the overall research output publications subsidised by the DHET.

The decline can be linked to a number of factors including loss of human capacity (retirements and resignations), the natural flow of research projects and graduations, changes in processes and, to a smaller extent, the withholding of units by the DHET and some publications could not be submitted within the time period.

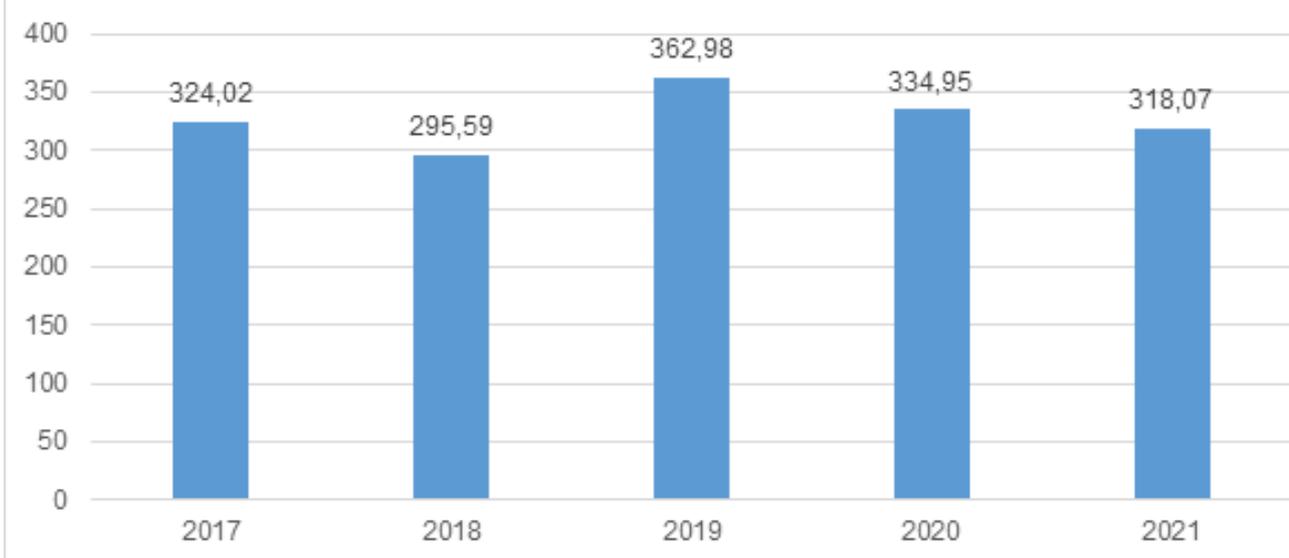
In 2021, the University continued to submit outputs to DHET electronically using the Clarivate Converis Research Information Management System. All reviews were done electronically by TUT as well as the DHET. The research output publications submitted to DHET for 2021 were 318,07 units. This is a decrease from the 334,95 units awarded for the 2020 submission, as detailed in Table 19 and Figure 10. The Faculty of Engineering and the Built Environment remains the leading faculty in terms of research output publications, followed by the Faculty , the withholding of units by the DHET and some publications could not be submitted within the time period.

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Table 19. Accredited research outputs per faculty

<i>Faculty</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>
Arts and Design	12.79	9.91	9.11	14.53	17.58
Economics and Finance	7.93	8.14	10.13	6.00	8.05
Engineering and the Built Environment	127.54	105.91	173.28	139.04	94.85
Humanities	31.33	25.33	31.50	21.58	66.54
ICT	18.15	24.00	31.21	26.62	22.39
Management Sciences	47.28	44.03	42.17	47.91	31.40
Science	69.30	71.05	60.50	68.27	72.93
Other (including units withheld)	10.25	7.14	5.08	11.00	4.33
Total	324.02	295.59	362.98	334.95	318.07

Figure 10. Total accredited research outputs per faculty



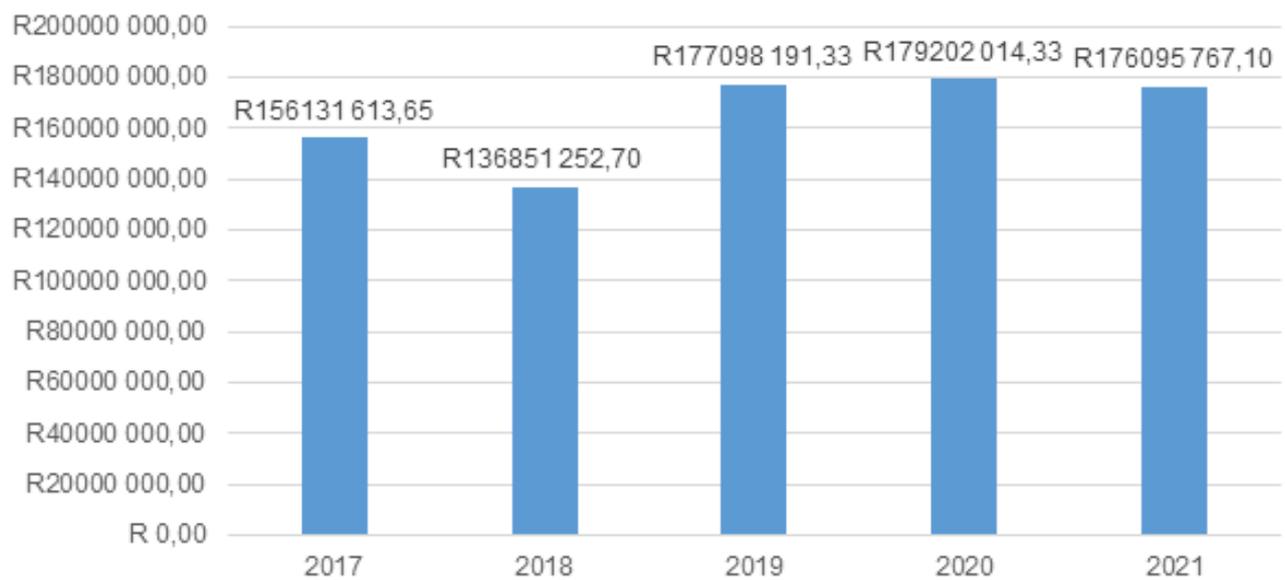
Funding

In addition to bursaries, scholarships and fellowships, TUT also enjoyed most of its research support from the NRF, DST and DHET as research and development grants for the advancement of research at the University. The overall external research income received by the University in 2021 since 2017 is highlighted in Table 20 and Figure 11. Even though the income from the NRF has slightly increased, there is room for improvement.

Table 20. External research income from 2017 including DHET

Year	DHET Research Outputs (R)	NRF, CITSIs & Other (R)	DHET RDG/UCDG (R)	Total (R)
2017	42 579 600.00	106 292 013.65	7 260 000.00	
2018	45 760 800.00	91 090 452.68	2 072 316.00	136 851 252.70
2019	54 336 480.00	121 147 179.33	1 614 532.00	177 098 191.33
2020	55 668 300.00	121 157 122.33	2 376 592.00	179 202 014.33
2021	64 207 250.00	110 320 688.46	1 567 828.70	176 095 767.10
Total	237 879 968.00	550 007 456.45	14 891 268.70	802 778 693.15

Figure 11. Total external research income since 2017



In 2021, R50 798 583.08 was awarded and released to TUT as bursaries, scholarships and research grants in comparison to R43 980 628.17 in 2020 as indicated in Table 21 below. This is an increase of external research income from the NRF. Some faculties enjoyed significant increases, like Sciences, Engineering and the Built Environment, ICT and Humanities, while a decrease was experienced by the faculties of Management Sciences, Economics and Finance and Arts and Design.

Table 21. NRF research income per faculty since 2017

Faculty	2017 (R)	2018 (R)	2019 (R)	2020 (R)	2021 (R)
Economics & Finance	60 000.00	294 515.36	313 371.52	472 534.58	257 000.00
Engineering and the Built Environment	6 033 493.84	7 911 807.66	9 686 740.17	14 116 705.77	18 035 703.83
Humanities	428 925.23	420 000.00	200 205.08	520 530.03	1 039 853.00
ICT	909 285.32	629 596.63	460 156.86	754 813.89	989 424.00
Management Sciences	538 799.85	5 187 334.90	4 133 135.91	993 933.53	591 500.00
Science	16 404 880.53	26 475 143.95	26 578 516.04	21 405 660.64	29 682 971.98
Arts and Design	160 000.00	248 905.14	373 144.66	706 449.73	202 130.27
Other	26 923 451.69	15 256 330.55	16 576 332.29	5 010 000	0
Total	51 458 836.50	56 423 634.19	58 321 602.53	43 980 628.17	50 798 583.08

In 2021, the University approved 65% of the total research outputs subsidy income to support the Senate Committee for Research and Innovation's research activities. About R27 812 242.83 million was shared with the faculties in 2021, which was a slight decrease of the amount shared in 2020. The faculties of Engineering and the Built Environment, Science, Humanities and Management Sciences have mostly benefitted from the institutional support in 2021 as indicated in Table 22 below.

Table 22. Faculty Research Funding (institutional) in the past five years

Faculty	2017 (R)	2018 (R)	2019 (R)	2020(R)	2021(R)
Economics & Finance	671 347.88	287 358.90	546 677.11	666 709.37	R 639 388.16
Engineering and the Built Environment	5 517 765.15	6 041 162.91	9 656 605.53	8 998 210.06	11 458 416.02
Humanities	2 974 096.40	2 434 320.51	3 456 921.67	2 914 424.24	3 511 273.13
ICT	887 986.77	1 111 536.95	1 785 474.60	2 432 338.39	2 465 858.40
Management Sciences	2 272 133.08	2 239 823.53	4 410 939.60	4 238 731.49	3 822 230.25
Science	4 078 912.82	4 486 584.58	6 354 929.84	7 286 199.21	5 119 746.39
Arts and Design	625 810.34	580 260.61	1 152 537.80	997 131.08	795 330.48
Total	17 028.052.44	17 181 047.99	27 364 086.16	28 013 087.82	27 812 242.83



Excellence recognition

Staff who excelled in their academic functions in 2019/2020 were given recognition at the Annual Academic Excellence awards ceremony held in 2021, which included improvement of rating and qualifications to Master's and Doctoral level. The awards are faculty and institutional based. Table 23 below shows the details of staff members who received awards under specific categories. based. Table 23 below shows the details of staff members who received awards under specific categories.

Institutional Research and Innovation Awards

Staff who excelled in their academic functions in 2019/2020 were given recognition at the Annual Academic Excellence awards ceremony held in 2021, which included improvement of rating and qualifications to Master's and Doctoral level. The awards are faculty and institutional based. Table 23 below shows the details of staff members who received awards under specific categories. based. Table 23 below shows the details of staff members who received awards under specific categories.



NRF rating upgrading

Title, Name and Surname	Faculty	Rating Category
Prof Abel Toriola	Science	C3
Prof Christian Wolkersdorfer	Science	C1
Prof Ntebogeng Mokgalaka	Science	C2
Prof Thomas Olwal	Science	C2

NRF newly rated researchers

Title, Name and Surname	Faculty	Rating Category
Prof Jacques Snyman	Engineering and the Built Environment	C3
Prof Manoj Lall	ICT	C3
Prof Thelma De Jager	Humanities	C2
Dr Wilma Augustyn	Science	C3

Table 23. 2021 Academic Excellence Awards (Institutional Winners)

Category	Recipient	Award
S2A3 Bronze Medal (SET faculties)	Mr J O Fayomi , Faculty of Engineering and the Built Environment Obtained a MTech cum laude under the supervision of Prof API Popoola, Prof OW Popoola, Dr OP Olajido	Winner
Masters Student of the Year (Non-SET faculties)	Ms M O Makgogo , Faculty of Economics and Finance Obtained a MTech cum laude under the supervision of Dr MF Zerihun	Winner
Doctoral Student of the Year	Dr O Sanni , Faculty of Engineering and the Built Environment Obtained a DTech under the supervision of Prof API Popoola, Prof AV Kolesnikov and Dr OS Fayomi Dr T J Mpofu , Faculty of Science Obtained a DTech under the supervision of Dr B Mtileni, Prof KA Nephawe and Dr H Ganesa	Winner
Postdoctoral Fellow of the Year	Dr O A Oyewo , Faculty of Engineering and the Built Environment Hosted by Prof MS Onyango	Winner
Researcher in Training of the Year (Female)	Dr G Senyolo , Faculty of Science	Winner
	Dr M M Ramakokovhu , Faculty of Engineering and the Built Environment	Merit
Researcher in Training of the Year (Male)	Dr T Mathonsi , Faculty of Information, Communication and Technology	Winner
	Dr I. T Toudjeu , Faculty of Engineering and the Built Environment	Merit
Emerging Researcher of the Year (Female)	Dr S Mnisi , Higher Education Development and Support	Winner
	Dr L Boshoff , Faculty of Management Sciences	Merit
Emerging Researcher of the Year (Male)	Prof R Mukonza , Faculty of Humanities	Winner
	Dr H Mason , Higher Education Development and Support	Merit

Capacity Builder of the Year	Prof R Mukonza, Faculty of Humanities	Winner
	Prof F D Dakora, Faculty of Science	Merit
External Research Income Earner of the Year	Prof K. K Mpofu, Faculty of Engineering and the Built Environment	Winner
	Prof A Viljoen, Faculty of Science	Merit
Research Group of the Year	<p>Sustainability Management Accounting & Governmental Financial Governance, Faculty of Economics and Finance - Leader: Prof H E Klingelhöfer, , Members: Ms Geyer, Mr Zulu, Mr JK Mafa, Dr L Smidt, Dr KN Motubatse, Prof P Mashigo, Dr MF Zerihun, Dr SX Mathonsi, Mr SJ Maluleke, Mr ZA Nkosi, Mr SM Rabotho, Ms A Legodi, Prof P Coetzee , Prof DP Van Der Nest</p> <p>Climate Change and Disaster Management, Faculty of Engineering and the Built Environment - Leader: Prof J Ndambuki, Members: Prof TO Olwal, Ms N Tladi, Dr LS Mudau, Prof L Monyatsi, Dr JT Magidi, Dr MM Mokoena, Dr C Khabo-Mmekoa, Prof TS Ramukumba, Prof. E. Mokgobu, Mr. M Muloiw, Mr. C. Allnutt, Prof MAA Coetzee, Prof. JO Okonkwo, Prof RI McCrindle, Prof. M Onyango, Prof JP Maree, Dr K Premlall, Prof SP Chowdhury, Dr TJ Morodi</p> <p>Information & Communication Technology for Development (ICT 4D), Faculty of Information, Communication and Technology - Leader: Dr E van Wyk, Members: Dr AAK Buitendag, Mr OJ Dehinbo, Mr M Gadebe, Dr R Hans, Prof JC Jansen Van Vuuren, Prof P Kogeda, Prof M Lall, Mr EM Letsoalo, Ms A Masethe, Mr HD Masethe, Prof PA Owolawi, Dr AB Pretorius, Mr TJ Ramabu, Mr V Ranko</p>	Winner

Innovator of the Year (Centres, Institutes, Technology Stations and Incubators)	Institute Of Nano-Engineering Research Prof R Sadiku received the award on behalf of the CITSI	Winner
Innovator of the Year (Patent)	Prof D Katerere, Faculty of Science	Winner
Vice-Chancellor's Researcher of the Year (Female)	Prof M NB Momba, Faculty of Science	Merit
Vice-Chancellor's	Prof K, Mpofu, Faculty of Engineering and the Built Environment	Winner
Researcher of the Year (Male)	Prof F Dakora, Faculty of Science	Merit

Table 24: Faculty Research Excellence Awards

Faculty	Category	Recipient	Award
Economics and Finance	Woman Researcher	Ms Audrey Legodi	Winner
	Senior Researcher	Dr Kgobalale N Motubatse	Winner
		Dr Mulatu Zerihun	Merit
Engineering and the Built Environment	Young Researcher	Dr Brendon Shongwe	Winner
		Dr Udochukwu B Akuru	Merit
	Senior Researcher	Prof Khumbulani Mpofu	Winner
		Prof Rotimi E Sadiku	Merit
Humanities	Senior Researcher	Dr Ricky M Mukonza	Winner
		Prof Jacob T Mofokeng	Merit
	Woman Researcher	Dr Thelma de Jager	Winner
		Prof Lydia K Mphahlele	Merit
	Young Researcher	Dr Khalabai E Mashaba	Winner
		Dr Olivia N Mafa-Theledi	Merit
Information and Communication Technology	Senior Researcher	Prof Pius Owolawi	Winner
		Dr Manoj Lall	Merit
	Woman Researcher	Dr Chunling Du	Winner
		Prof Joey C Jansen van Vuuren	Merit
	Young Researcher	Mr Topside Mathonsi	Winner
		Dr Top S Adeyelure	Merit
Management Science	Senior Researcher	Prof Zeleke Worku	Winner
		Dr Emmanuel I Edoun	Merit
	Woman Researcher	Prof Vinessa Naidoo	Winner
		Prof Carina Kleynhans	Merit
	Young Researcher	Dr Joseph Roberson	Winner
		Dr Ndivhuwo N Tshipala	Merit
Science	Senior Researcher	Prof Leshweni J Shai	Winner
		Prof Puffy Soundy	Merit
	Woman Researcher	Prof Yvonne Paul	Winner
		Prof Retha M Slabbert	Merit
	Young Researcher	Dr Belinda du Plessis	Winner
		Dr Grany Senyolo	Merit
Arts and Design	Senior Researcher	Prof Rudi W de Lange	Winner
	Woman Researcher	Prof Anne Mason	Winner
		Dr Anne Scheffer	Merit
	Young Researcher	Dr Pfunzo Sidogi	Winner

CITSIs, INNOVATION AND TECHNOLOGY TRANSFER

The University contributes to social and economic upliftment transformation through relevant curricula, impactful research and engagement, quality learning experiences, committed/ competent people and an enabling environment. Amongst its strategic goals is to be responsive to societal and environmental needs through impactful research, innovation and technology transfer. The University considers, among others, the generation and application of knowledge as one of the critical components in attaining its vision. This accords with the prescripts of the Intellectual Property Rights (IPR) from the Publicly Financed Research and Development Act, 2008 (Act No. 51 of 2008), which came into force on 2 August 2010. In order to give effect to the provisions of the IPR Act (Act No. 51 of 2008), TUT established an Innovation and Technology Transfer Office (ITTO).

ITTO supports the University's researchers, students and staff members who wish to protect and commercialise their research output or inventions. This is done by filing patent applications for protection and by licensing intellectual property rights to an industry partner, or by the formation of a spin-out company. ITTO identifies, assesses, protects and commercialises Intellectual Property. It also assists with the further development of technologies that meet specific industry needs through limited seed funding. Our unique suite of services includes access to Centres, Institutes, Technology Stations and Incubators (CITSIs) facilities, access to Technology Entrepreneurship Programme, capacity development, linkages to industry, commercial research and consulting, limited seed funding and legal advice.

11.1. Intellectual Property (IP) Management

This section will present the number of invention disclosures received and assessed in the reporting period, patent applications filed and the number of patents granted. The patenting process starts with disclosing an invention to ITTO. Students and staff members are expected to disclose their patentable ideas within 90 days. A Standard IP disclosure form is used to disclose an invention to ITTO. The ITTO's performance against pre-determined objectives is presented in Table 25.

Table 25. ITTO key performance indicators in 2021

KPIs	Numbers achieved
Number of disclosures	16
Number of provisional patents filed	5
Number of complete patents filed	6
Workshops on IP and Technology Commercialisation	13
Innovation Talk (seminar)	5
Market assessment	75%
Marketing of technologies	4
Licensing	1
Number Start-up company assisted	20

Table 26. Invention disclosures received during the reporting period

Names of invention	Faculty	Outcome
a) Automated Real Time Screening	Information and Communication Technology	Non-Actionable
b) rGO/CuO/PPy nanocomposite for supercapacitor and battery electrodes	Engineering and the Built Environment	Actionable
c) Bread enriched with proteins from insects and marula seedcake.	Science	Actionable
d) Fungal Pigments with Biological Properties	Science	Non-Actionable
e) Wisdom Manufacturing System Application (Wmsapp)	Engineering and the Built Environment	Actionable
f) Underground Cable Theft Detection System	Science	Actionable
g) Maize-tassel for water purification.	Science	Non-Actionable
h) Personal Radio Recorder	Engineering and the Built Environment - TSE	Actionable
i) Aluminium Carbon nanotubes Niobium Composite Conductor for High voltage Transmission Networks	Engineering and the Built Environment	Actionable
j) Application of a monolithic refractory on the discontinuity sections inside the coke drum pressure vessel by the head to skirt junction location	Engineering and the Built Environment	Actionable
k) Analytical Tool	Engineering and the Built Environment	Actionable
l) Finger Sanitiser	TSE-Engineering and the Built Environment	Actionable
m) Cooling Unit Suitable for Solar Panels Used In Transport Refrigeration	Engineering and the Built Environment	Actionable
n) Air Cushion	Engineering and the Built Environment	Actionable
o) Use of Waste Biomass for the Production of Low-cost, Environmentally Friendly Briquettes	Faculty of Science	Actionable
p) Energy Efficiency (EE) Monitoring data logger for Industry 4.0	Engineering and the Built Environment	Non-Actionable

Table 27. Provisional patent applications filed

Title of invention	Faculty
a) A Wheelchair	Engineering and the Built Environment
b) Cooling Unit Suitable for Solar Panels Used in Transport Refrigeration	Engineering and the Built Environment
c) A Composite Conductor	Engineering and the Built Environment
d) Nanocomposite Materials	Engineering and the Built Environment
e) Biomass Briquette	Science

Complete patent applications

In the reporting period, the Office filed six complete patent applications. Table 28 presents the patent applications filed.

Table 28. Complete patent applications

Title of invention	Faculty
Method Of, And System For, Designing/Creating A Bending Process Plan/Procedure	Engineering and the Built Environment
A Trap and Container (for TSE)	Engineering and the Built Environment
GenoTrack	Science
Reconfigurable Fixture, A Reconfigurable Fixture System, And A Method of Operating A Reconfigurable Fixture System (Concept1)	Engineering and the Built Environment
Reconfigurable Fixture, A Reconfigurable Fixture System, And A Method of Operating A Reconfigurable Fixture System (Concept 3)	Engineering and the Built Environment
A Multi-Function Routing Tool	Engineering and the Built Environment

Patents granted

A number of patents in the Republic of South Africa's territory were granted for the Faculty of Engineering and the Built Environment in 2021 as listed in Table 29.

Table 29. Patents granted

Title of invention
Energy Management System and Method was granted on the 26 May 2021
Braid sealer apparatus A2020/00399, was granted on 25 August
Braid sealer body A2020/00400 was granted on 17 June 2021
Driving control, was granted on the 2019/01/30, the office received the copy of granted certificate on the 14th of September 2021

Trainings/workshops on IP and Technology Transfer advocacy

A number of workshops were conducted in different faculties in 2021 as presented in Table 30 below.

Faculty	Date of event	No of attendance
Arts and Design	10-February-2021	56
All (IP101)	24-March-2021	14
Engineering and the Built Environment	30 March 2021	26
ICT	16- April 2021	112
All (IP clinic)	3-August-2021	19
Arts and Design	16- September 2021	50
ICT - Varsity Hackathon	16-September 2021	91
All faculties-IP Clinic	20 September 2021	31
Engineering and the Built Environment (industrial student 2 nd year)	20-October-2021	25
Engineering and the Built Environment (industrial students 1 st year)	20-October-2021	9
Science	21 October-2021	137
ICT	10-November-2021	24
ICT	17-November-2022	94

11.2. Commercialisation

Seed fund

New projects, as listed in Table 32 below, were approved for funding through TUT-Technology Innovation Agency (TIA) Seed Fund Programme in 2021.

Table 32: Seed Funded Projects 2021

TIA seed fund_Project Name	Approved Amount
Developing a multiplexed 3D-printed prototype point-of-care testing device for HIV and HCV in high risk populations.	R480 700
Clinical testing of imine-containing African honey for efficacy on selected cancer	R500 000



11.3. Centres, Institutes, Technology Stations and Incubators (CITSI)

It is the policy of the University to establish formal organisational structures to promote research, innovation, partnerships and community engagement. This section will cover the list of all registered CITSI in 2021 (Table 33), research outputs, financial reports and some highlights.

Table 33. List of registered CITSI in 2021

Name	Faculty	Contact person
Centre for Energy and Electric Power	Engineering and the Built Environment	Dr Olawale Popoola
Centre for Environmental Health	Science	Dr Thabiso Morodi
Centre for Tissue Engineering	Science	Ms Rhyleen Chauke
Marketing Research and Development Centre	Management Sciences	Dr Anton Drotsky
Institute for Economic Research on Innovation	Economics and Finance	Prof Rasigan Maharajh
F'SATI	Engineering and the Built Environment	Prof Anish Kurien
Institute for Advanced Tooling	Engineering and the Built Environment	Mr Jeff Makhubela
Technology Station in Chemicals	Engineering and the Built Environment	Mr Vincent Tau
Technology Station in Electronics	Engineering and the Built Environment	Dr S J Jacobs
Centre for Creative Industries	Arts and design	Prof K Chinyowa
Institute for Nano-engineering	Engineering and the Built Environment	Prof R Sadiku
Centre for Sustainable Tourism	Management Sciences	Dr Uwe Hermann
Centre for Applied Chemistry Research	Science	Prof Leskey Cele
Centre for Entrepreneurship Development	Management Sciences	Dr Patrick Ebewo JR
Institute for Future Work	Vice Chancellor and Principal	Prof Lourens Van Staden

CITSIs' financial performance

It is the policy of the University to establish formal organisational structures to promote research, innovation, partnerships and community engagement. This section will cover the list of all registered CITSIs in 2021 (Table 33), research outputs, financial reports and some highlights.

Table 34. CITSIs' Financial Performance

CITSI	2021
Centre for Creative Industries	R0
Centre for Energy and Electric Power	R 1 673 838.40
Centre for Entrepreneurship Development	R 1 600 00.00
Centre for Environmental Health	R 695 000
Centre for Sustainable Tourism	R169 797.96
Centre for Tissue Engineering	R 21 770 063,29
French South African Institute for Technologies	R 13 152 290,45
Institute for Advanced Tooling	R 13 602 283.00
Institute for Economic Research on Innovation	R0
Institute for Nano-Engineering Research	R2 226 035.47
Marketing Research and Development Centre	R0
Technology Station in Chemicals	R 5 165 269
Technology Station in Electronics	R 12 826 242

12. INTERNATIONALISATION AND AFRICA ENGAGEMENT

12.1. Introduction and Executive Summary

The initiatives managed and coordinated by the Internationalisation and Africa Engagement (IAE) seek to enhance the University's world class competitiveness and standing by subscribing to the principles of internationalisation in education and implement relevant elements to applicable activities. In realisation of this goal, the IAE portfolio supports and advises faculties, researchers, staff and students to enable TUT's full engagement in international initiatives is realised.

The IAE portfolio aims to broadly encourage collaborations in the areas of research, innovation and engagement activities; support the development of research capacity through joint supervision, mobility programmes and exchange programmes; capacity building and development of knowledge.

12.2 Internationalisation and Africa Engage response to Strategic Pillars

In response to the TUT ISP 2020-2025, the Internationalisation and Africa Engagement (IAE) portfolio has achieved the following outcomes against the ISP 2020-2025 Pillars:

i. Strategic Pillar I: Future-ready graduates who make a positive societal impact

The IEA portfolio assessed and published international study opportunities aimed at increasing scholarship, research and innovation received from international partners (universities, embassies and agencies).

These opportunities include scholarships for short-term courses, Bachelor's, staff and student exchanges, research projects, Master's, PhD and Post-Doctoral studies. The following measures were also deployed:

- Development of internationalisation webpage to promote the visibility and standing of the Internationalisation in the University.
- Informing of faculties on Internationalisation initiatives through FCRI.
- Communiques on available study opportunities are published on TUT Webmail at least monthly.
- Development of a subscription list for email campaigning.

ii. Strategic Pillar III: Impactful research, innovation, engagement and technology transfer to foster growth, development and sustainability

The IEA portfolio has increased its footprint at Faculty level. The IEA Office made a presentation in six Faculty Committees for Research and Innovation (FCRI) meetings to provide guidance and support to faculties on internationalisation initiative.

A reporting template for international MoUs/MoAs at Faculty level was developed and to date seven completed reports have been received from faculties. The reports have been consolidated.

Guidelines on the support provided by IEA to outgoing and incoming staff/students exchange programs has been developed and it is being consulted with stakeholders within TUT.

iii. Strategic Pillar IV: Digitally advanced university

All opportunities available are published on the Website as of 31 October 2021. A subscription list for email campaigns has been developed on MS Forms and it is managed in accordance with the POPI Act.

The internationalisation subscription mailing list is gradually increasing, this implies that more students and staff members have access to international study opportunities (Figure 12):

4. Staff or Student @ TUT

[More Details](#)

● Staff	35
● Student	128
● I am not a student nor a staff ...	8

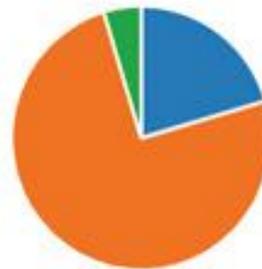


Figure 12: The internationalization subscription mailing list numbers

12.3. Review of the Policy on Internationalisation

The process of reviewing the TUT Policy on Internationalisation commenced in September 2021 and will be finalised in 2022. The Policy is being reviewed in line with the Department of Higher Education and Training (DHET) 2020 Policy Framework on Internationalisation of Higher Education in South Africa.

One staff member in the IAE will be attending training on the DHET 2020 Policy Framework on Internationalisation of Higher Education funded by DAAD (German Scholarship Agency) in the 2022 academic year for capacity building.

12.3. Review of the Policy on Internationalisation

The process of reviewing the TUT Policy on Internationalisation commenced in September 2021 and will be finalised in 2022. The Policy is being reviewed in line with the Department of Higher Education and Training (DHET) 2020 Policy Framework on Internationalisation of Higher Education in South Africa.

One staff member in the IAE will be attending training on the DHET 2020 Policy Framework on Internationalisation of Higher Education funded by DAAD (German Scholarship Agency) in the 2022 academic year for capacity building.

12.4. Internationalisation: Generation of Funding

Discussions are underway with the Technological Higher Education Network South Africa (THENSA) for TUT to host up to nine PhD candidates for 2022 – income to be generated is approximately R1,2 million. The Chinese PhD candidates will be funded by THENSA for supervisory capacity.

12.5. IMPROVING OF INTERNAL STRATEGIES/POLICIES FOR INTERNATIONALISATION

A reporting template for international MoUs/MoAs at Faculty level was developed and to date, seven completed reports have been received from the faculties, the reports have been consolidated. The following agreements have been signed between August and December 2021:

i. University of Naples, Italy

TUT and the University of Naples signed an MoU on 2 December 2021. The purpose of the MoU is to Exchange academic researchers and students during collaborative training and research activities. Approach the funding organizations to consider funding contributions to:

- Fellowships and Doctoral programs for training of staff and students
- Visiting scholars during their sabbatical

The MoU further facilitate and support research in the following:

- Pharmaceutical and Nutraceutical evaluation of new natural sources
- Healthy Food and their use in medicine and in the prevention of chronic diseases
- Novel food and nutraceutical ingredients
- Food safety and quality evaluation

ii. Universitat Politècnica de València (Valencia Polytechnic University), Spain

The University and the Polytechnic University of Valencia (UPV), Spain agreed to cooperate in student and staff exchanges under the Erasmus+ KA107 programme.

The staff exchange programme is aimed at enhancing scholarly capacity between the two institutions while the student exchange programme is intended at providing Master's and Doctoral students with research mentorship and training in the field of Information and Communication Technology (ICT).

iii. University of Reunion Island, France

Through an MoU signed by TUT and the University of Reunion Island in 2021 the following have been achieved:

- Research collaboration in Science between the two institutions;
- Submission of research proposal for funding;
- Student co supervision;
- Joint workshops and publications; and
- Performing of experiments.

iv. International University of Management and Administration, Benin

An MoU has been signed between TUT and the International University of Management and Administration to facilitate collaboration in research and development of multidisciplinary and sustainable solutions to the problem of campus violent crimes, gender discrimination and or gender-based violence and technology access specifically at institutions of higher learning.

12.5.1. Guidelines

The process of reviewing the TUT Policy on Internationalisation commenced in September 2021 and will be finalised in 2022. The Policy is being reviewed in line with the Department of Higher Education and Training (DHET) 2020 Policy Framework on Internationalisation of Higher Education in South Africa.

One staff member in the IAE will be attending training on the DHET 2020 Policy Framework on Internationalisation of Higher Education funded by DAAD (German Scholarship Agency) in the 2022 academic year for capacity building.

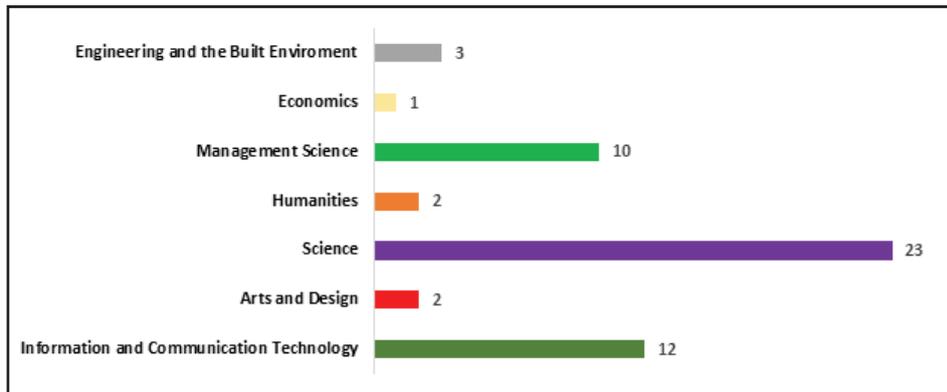


Figure 13: International MOUs per faculty



Figure 14: MoUs per Continent

12.6. International Collaborations

The IEA has facilitated a signing of five new MoUs for partnerships and one has been renewed in 2021. The signed MoUs regulate TUT's collaboration in research development, mobility programmes and exchange programmes.

12.6.1. Other Internationalisation Engagements

Below are engagements with international partners on partnerships

- Meetings with the Nanjing University of Technology, China to discuss technology transfer.
Academics from both universities have been linked to further discuss the area of collaboration.
- South Africa - Sweden University Forum (SASUF) - Student leader nominated for the SASUF Student leadership project coordinated by the Uppsala University.
- Meetings with Foreign Embassies to discuss possible collaborations (USA, Germany, China, Finland).

Conclusion

The Internationalisation and Africa Engagements portfolio is in a process of improving internal strategies in managing international collaborations, this includes improving the reporting templates, guidelines and marketing strategies.



FACULTY OF **ART & DESIGN**

FACULTY OF ARTS AND DESIGN

113. FACULTY OF ARTS AND DESIGN

Academic departments

Department of Design Studies – Dr S Mbatha

Department of Fine and Studio Arts – Dr P Sidogi

Department of Interior Design – Ms I Newport

Department of Performing Arts – Dr R Pashkevitch

Department of Visual Communication – Mr H Botes

Niche areas:

The Faculty has two niche areas:

1. Critical Studies in Visual Arts – Dr P Sidogi
2. Reconstruction of the past and crafting a new multicultural South African landscape through the arts – Prof A Mason

Centres, Institutes, Technology Stations and Incubators (CITSI):

The faculty has one centre:

Centre for creative industries

Seminar:

The Faculty has a one dialogue seminar:

A re Bueng – Dr P Sidogi & Dr R Lepere

NRF-rated researchers:

2019	2020	2021
2 Prof Ebewo Prof Sirayi	3 Prof Sirayi Prof Mugovhani Dr A Jansen Van Vuuren	3 Prof G Mugovhani Dr A Jansen Van Vuuren Prof R de Lange

Staff Improvement of Qualifications

2021 Improved Doctoral Qualifications

Dr S Mbatha

Dr P Sidogi

Dr R Lepere

Dr L Orlandi

2021 Improved Master's Qualifications

Mr K Khiba

Mr WT Mgcodo

Conference

In 2021, our staff members attended an online conference due to Covid-19.

Research Outputs

The Faculty is committed to continue encouraging and providing capacity building opportunities for staff. We are engaged in on-going efforts to reinforce our commitment to scholarship through research and innovation. We continue to conduct research and communicate our findings effectively to students and the larger community of scholars. Through our 'A re bueng Arts Dialogue' we have established a critical awareness of an academic culture where cross fertilisation of ideas and exposure to international trends has been continually strengthened by the number and quality of presentations conducted.

Research outputs

Year	2017	2018	2019	2020	2021
Research Outputs	12.79	9.91	9.21	11.41	17.05

Research Methods Course



The continuous Research Methods Course is now in its eighth year since its inception in 2014. The course continues to be a benefit to Master's and Doctorate students who need to enhance and improve their research methods skills and academic writing techniques. The Research Methods Course has had a positive influence on graduation rate. With reference to the table below our graduation rate has a slight change compared to previous years. In 2021 the course was presented in the second semester, September to accommodate the block B registration.

Postgraduate student graduations

Qualifications	2017	2018	2019	2020	2021
Masters	12	8	12	10	12
Doctoral	2	3	0	4	1

Academic Excellence Awards: 2021

Senior Researcher of the Year – Prof Owen Seda

Merit - Senior Researcher of the Year – Prof Ndwamato G Mugovhani

Women Researcher of the Year – Prof Janine Lewis

Emerging Researcher of the Year – Dr Pfunzo Sidogi



**FACULTY OF
ECONOMIC & FINANCE**

MESSAGE FROM THE EXECUTIVE DEAN



Prof Polly Mashigo

Executive Dean of Economics and Finance, Interim Campus Rector

Despite all the unique ever-evolving challenges brought about by the resurgence of the Covid-19 pandemic from 2020 to 2021, the Faculty remained focused on overcoming the challenges and has made astonishing strides in academic excellence including research, innovation, and engagements. Our Faculty scholars continue to publish good quality research work in high impact factor journals of repute. Of importance is identifying and growing our research niche areas and ensuring that the quality and impact of research keeps improving alongside ongoing collaboration and engagement with the most critical challenges our continent faces. In addition, we deliver research-informed and high-quality experiences to our postgraduate stu-

dents who, in turn, demonstrate the attributes of working and thinking independently. In line with the University motto that “we empower people”, the Faculty takes pride in staff who have made many sacrifices and put in huge amounts of extra efforts to produce future-ready graduates who make knowledge work. It is inspiring to see some of our researchers impacting both locally and internationally by collaborating across disciplines to conduct high impact research.

Prof Philna Coetzee - Faculty Research Coordinator

“Our support to staff included one-on-one mentorship in qualitative and quantitative research methodology, academic writing support, finding a topic and/or supervisor, to name a few.”

The following activities occurred in 2021:

- Access to external mentors (qualitative and quantitative) by staff.
- Staff and students access to in-house mentor.
- Between 15 January and 26 March 2021, we had six (with two presented by staff and four by outside mentors).
- Statistician developed checklists for statistical analysis.
- 14 General training sessions for staff and students presented in-house.
- One half day session on qualitative research by external presenter.
- Two full day sessions on Atlas.ti by external presenter.
- Half-hour session with each staff member to determine their research activities, problems and needs.
- Research portal was developed where guidance material was placed to be used by staff and students.

UNESCO Chair

The Faculty through the Institute of Economic Research on innovation (IERI), has secured UNESCO Chair on African Integration and Innovation (held by Prof Scerri). IERI and the University of Lund's Economic History Department have developed a partnership to improve research and training on Africa's political economy of innovation. The Chair secured \$50,000 per year for the next three years (May 2021 - May 2024).

Postdoctoral Research Fellows

The year 2021 was marked with exciting news about the appointment of Dr Harris Maduku as the new Post-Doctoral Fellow. Dr Maduku has been appointed in the Department of Economics and hosted by the HOD, Dr Zerihun. He was appointed in 2021 and re-appointment in March 2022 because of his outstanding performance. He received a warm welcome by both Prof Coetzee and Dr Zerihun.

National Research Foundation (NRF) Rating

The following staff members have undergone a rigorous evaluation by peers at the NRF. Both Dr Zerihun and Prof Coetzee have been evaluated and rated by the NRF in 2021 and placed in the C category at level C2. Prof HE Klingelhöfer was awarded with the Best Niche Area in the University in 2021.

Research Output - Publication and Postgraduate graduations

Accredited Research Output Publications per faculty per year since 2015

Accredited Research Output Publications per Faculty per year since 2015

Faculty	2016	2017	2018	2019	2020	2021
Economics & Finance	8.23	7.93	8.14	11.46	5.99	8.83

Economics and Finance	M	2	9	5	10	8
	D	1	0	0	0	0

Accredited Journal Articles 2021

Surname	Initials	Other Authors (non-affiliated, semi-colon delimited)	Journal Title	Article Title	Index	ISSN	e-ISSN
ZERIHUN	MF		Environments - MDPI	Agroforestry Practices in Livelihood Improvement in the Eastern Cape Province of South Africa	WoS	2079-9292	2079-9292
ZERIHUN AKINBOWALE KLINGELHÖFER	MF OE HE		Academy of Accounting and Financial Studies Journal	The Integration of Forensic Accounting and the Management Control System as Tools for Combating Cyberfraud	Scopus	1096-3685	
COETZEE	G P	du Plessis A	Industry and Higher Education	Face-to-face soft skills for entry-level internal auditors: A practice perspective	Scopus	0950-4222	2043-6858
XERRI	M		Innovation and Development	The viability of systems of innovation	Scopus	2157-930X	2157-9318

SMIDT VAN DER NEST	LA DP	Steenkamp L Lubbe DS	International Journal of Information Systems in the Service Sector	Assessment of the Purpose of the Use of GAS: A Perspective of Internal Audit Functions in Australia	Scopus	1935- 5688	1935- 5696
MADUKU	H	Harris Maduku; Brian Tavonga Mazorodze	Economics of Development	Government expenditure and macroeconomic stability conundrum in Zimbabwe	DOAJ	1683- 1942	2304- 6155
COETZEE	G P	Erasmus LJ; Coetzee P; du Preez A; Msiza CD	Journal of Accounting, Finance and Auditing Studies	The Relationship between Audit Committee Best Practice and Good Governance	DOAJ		2149- 0996
ZERIHUN MADUKU	MF H		Management and Economics Research Journal	Foreign Direct Investment and Economic Growth in South Africa: On Direction of Causality	DOAJ		2469- 4339

Surname	Title of Proceeding	Title of Contribution
Klingelhofer HE	2021 International Business Conference	Applicability of the balanced score card as a performance measurement tool for small fast food businesses in Central Rustenburg
Klingelhofer HE, Aghachi JE	2021 International Business Conference	Management Accounting Perspective to Improving Risk Management Measures – An Example from a Medium-Sized Nigerian Company
MOTUBATSE	An Analysis of Oral Presentation at the Universities of Technology in South Africa: Communication Skills for Audit Qualifications	An analysis of oral presentation at the universities of technology in South Africa, Communication skills for audit qualifications Full paper reviewed - paper publication
Klingelhofer HE, Obioha EO	Integrated Framework for Measuring the Impact of Corporate Sustainability Performance on Financial Performance via Customer Attraction	Integrated Framework for Measuring the Impact of Corporate Sustainability Performance on Financial Performance via Customer Attraction
Geyer JCIJ, Klingel Hofer HE, Nabane C	Regulatory Measures with which to inhibit Irregular Expenditure and Develop Corrective Measures in the Department of Water and Sanitation	Regulatory Measures with which to inhibit Irregular Expenditure and Develop Corrective Measures in the Department of Water and Sanitation

Chapters in Books



Surname	Title of Book	Title of Contribution	Editor(s) if applicable	Publisher	ISBN/e-ISBN
MAHARAJH R	The Oxford Handbook of The South African Economy	Knowledge, Technology and Innovation	Oqubay A, Tregenna F, Valodia I	Oxford University Press	9780192894199
MAHARAJH R	The 4th Industrial Revolution: A sociological critique	Long-run Global Perspectives on Evolution, Revolution, and Innovation in south Africa's Development	Ngwane T, Tshoaedi M	Jacana Publishers	9781431431557

Scholarship and Professional Participation

Dr Rasigan Maharajh's

Academic Appointments

Academy of Science of South Africa (ASSAf)	Elected Member (2021 – present)
Pan-African Scientific Research Council	Fellow (2021 – present)
AfricaLICS	Scientific Board Member (2012 – present)
Tshwane University of Technology	Senate (Elected Member) (2019 - 2021)
Rhodes University	Ministerial Representative to Council (2020 - 2024)

Academic Journals

Education as Change	Management Committee	ISSN: 1947-9417
Research Policy and Strategic Management: Specialty Section of Frontiers in Research Metrics and Analytics	Review Editor on the Editorial Board	https://www.frontiersin.org/
Journal of Economic Policy Reform	Peer Reviewer	ISSN: 1748-7870 e-ISSN: 1748-7889
Minerva: A Review of Science, Learning and Policy	Peer Reviewer	ISSN: 0026-4695 e-ISSN: 1573-1871
Journal of S&T Policy and R&D Management	International Board of Editors	e-ISSN: 2407-8271
Acta Academica	Peer Reviewer	e-ISSN: 0587-2405
Energy Policy	Peer Reviewer	ISSN: 0301-4215
Foresight	Peer Reviewer	ISSN: 1463-6689
South African Journal of Science	Peer Reviewer	e-ISSN: 1996-7489

Selected Research Publications

“Knowledge, Technology and Innovation,” Chapter 22 in Arkebe Oqubay, Fiona Tregenna, and Imraan Valodia [editors] [The Oxford Handbook of the South African Economy](#), Oxford University Press, with Erika Kraemer-Mbula; ISBN: 9780192894199.

“A Vaccine Against Intellectual Hubris,” [Errant Journal](#) 1(2): 77-81

“Long-run Global Perspectives on Evolution, Revolution, and Innovation in south Africa’s Development,” Chapter 4 in Trevor Ngwane and Malehoko Tshoaedi [editors] [The Fourth Industrial Revolution: A Sociological Critique](#), Jacana, Johannesburg, ISBN: 9781431431557.

“[Advancing Sustainable Futures for All: 21st Century Public Engagement and Mission-orientated Research](#)”, Global Research Council, London; ISBN: 9781868681136.



COMMUNITY ENGAGEMENT PROJECTS AND INDUSTRY RELATIONS

As part of community engagement, the Department of Accounting further facilitated a signing of another Memorandum of Agreement between the TUT and the BANKSETA to support the community engagement programme. This programme aimed at preparing Grade 12 learners for career advancement in the 4th Industrial Revolution through exposure to digital skills as well as work readiness programmes.

This is a BANKSETA funded programme, which was part of the Skills for the Future Project (SFF). According to the BANKSETA, the rationale for the SFF project is to provide an opportunity to address

digitalisation and technology as one of the key drivers of change that impact the broader banking sector, and to bridge the shortage of scarce and critical skills nationally and globally by increasing the pool of talented and qualified scholars and graduates in the field of commerce, and ICT.

It is also noteworthy that many sectors of the South African economy will require these skills sooner rather than later to respond to the 4IR needs.

This project was purported to expose 100 Grade 12 (Matriculants) learners from the rural parts of the Limpopo Province to spend 12-15 days on a programme that covers digital transformation, career development and work readiness. BANKSETA has provided the financial muscle and partnered with TUT as a public University of Technology to offer the training programme. The project is curated under the Department of Accounting located at Ga-Rankuwa Campus.

The project was in two phases:

- Phase 1 (23-25 September 2021): Three-day workshop on work readiness and career counselling programme.
- Phase 2 (3-15 December 2021): Up to ten days of digital literacy programme that incorporates ICT skills (with special focus on programming skills). Digital literacy and coding using visual basics.

The workshops were held at the two targeted schools: Ipopeng and Ngakana Secondary Schools from the Setumong and Madiatane villages respectively. The two villages are located at Ga-Matlala, a rural area 50km west of Polokwane. Setumong is the capital of the Ga-Matlala tribal chieftaincy and headquarters of the Bakone Traditional Council.



Learners that participated in the workshops originate from at least 15 other villages surrounding the above-mentioned villages within the said tribal chieftaincy. Tablets were procured for training of the students. These tablets were awarded to the learners at the end of the programme. The devices were pre-installed with a sim card (LTE) ensuring that data could be transferred to the learners to enable them to continue to install MSOffice, practice their coding skills, engage with end-user computing and write and submit their individual assignments online. Phase 2 was extended with online assessment and post training technical support. The assessments were finalised at the end of January 2022. Both phase 1 and 2 were successfully implemented. A certification ceremony was held on 11 December 2021 at the TUT Polokwane Campus where learners officially received their devices and certification of attendance and recognition.



**FACULTY OF
ENGINEERING & THE
BUILT ENVIRONMENT**

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

The Faculty consists of eight academic departments:

1. Department of Architecture and Industrial Design
2. Department of Building Science
3. Department of Chemical, Metallurgical and Materials Engineering
4. Department of Civil Engineering
5. Department of Electrical Engineering
6. Department of Geomatics
7. Department of Industrial Engineering
8. Department of Mechanical and Mechatronics Engineering

The Faculty has six Centres, Institutes, Technology Stations and Incubators (CITSI):

1. Centre for Energy and Electric Power
2. Institute for Advanced Tooling
3. Institute on Nano-Engineering Research
4. French South African Institute of Technology
5. Technology Station in Electronics
6. Technology Station in Chemicals

The Faculty of Engineering and the Built Environment continues to play a leading role in contributing to the objectives of the National Development Plan and ensuring its success. Key among the contributions are postgraduate training and the execution of cutting-edge research projects. The research and innovation achievements are a result of viable partnerships between the Faculty and Government agencies, tertiary institutions, the private sector as well as international partners.

The year 2021 was another positive year despite the pandemic faced throughout the world as the Faculty demonstrated its strong research and development capacity.



In the area of postgraduate studies, 21 Doctoral and 74 Master's degree students completed their studies during 2021. The Faculty is proud of this achievement and once again congratulates its staff and students who have worked tirelessly to achieve this outcome.

Research in the Faculty is primarily coordinated by the four approved Niche Areas and four other research groups.

The approved Niche Areas are:

1. Advanced Catalysis Technologies (ACT) - Leader: Prof RKK Mbaya
2. Climate Change, Water Security and Disaster Management - Leader: Prof JM Ndam-buki
3. Applied Refrigeration and Thermal Energy Systems - Leader: Prof Z Huan
4. Operations and Engineering Management - Leader: Dr JA Swanepoel

The other research groups are:

1. Appropriate Architecture for Africa [A3] - Leader: Dr MEN Nkambule
2. Control, Image Processing and Machine Intelligence - Leader: Prof Y Hamam
3. Telecommunications and Signal Processing - Leader: Prof K Djouani
4. Energy and Industrial Power Systems - Leader: Prof JL Munda

The Faculty hosts six Centres, Institutes, Technology Stations and Incubators (CITSIs). The CITSIs play a crucial role in the Faculty's research endeavours and approach to innovation. The CITSIs have contributed significantly to ensuring that the Faculty continues to contribute meaningfully to the lives of many in South Africa by supporting and developing SMMEs while providing training and consultation.

Research chairs are specialists in specific areas because of their continued research efforts, expertise and ratings. The main goal of the research chairs is to strengthen and improve research and innovation capacity of public universities by producing high-quality postgraduate students, research and innovation outputs while increasing the production of Master's and Doctoral graduates.

The Research Chairs are:

1. NRF SARChI - Enabled Environment and Assistive Living - Leader: Prof K Djouani
2. Gibela - Manufacturing and Skills Development - Leader: Prof K Mpofo
3. merSETA Chair in Intelligent Manufacturing - Leader: Dr SJ Jacobs
4. NRF SARChI - Spatial Transformation (Positive change in the Built Environment) - Leader: Prof AOS Osman
5. NRF SARChI - Future Transport Manufacturing Technologies - Leader: Prof K Mpofo
6. NRF/DSI SARChI Innovation Studies - Leader: Prof M Muchie
7. EWSETA - Wastewater and Solid Waste Management - Leader: Prof J Snyman
8. Development Bank of Southern Africa (DBSA) - Leader: Prof OM Popoola

South African Research Chairs Initiative (SARChI) Manufacturing, Engineering and Related Services Sector Education Training Authority (merSETA) The Energy & Water Sector Education Training Authority (EWSETA)

All these achievements would not be possible without the contributions by dedicated staff and students in the Faculty, as well as the support from the various units in the University. We wish to express our sincere gratitude to all those who have contributed to making 2021 successful.

FACULTY HIGHLIGHTS

Seasoned Civil Engineering Technologist obtained NRF rating



Prof Jacques Snyman, a registered Civil Engineering Technologist, Associate Professor, and the Head of Department: Civil Engineering has obtained his National Research Foundation (NRF) rating to a C3.

Prof Snyman holds a Doctor Technologiae (Civil Engineering) Degree, and his lecturing experience extends to over 28 years with specialisation in the fields of Water Engineering: Hydraulics, Hydrology, Water and Wastewater Treatment Technology, Water Resource Planning and Management. He is also a specialist in Environmental Engineering: Solid Waste Management and Environmental Impact Assessment and Management.

Prof Snyman has published extensively on topics in the field of Water Resource Management and Solid Waste Management. His career has demonstrated consistent success as both an administrator and educator in higher education.

His other research interest is on Water and Wastewater Engineering with the focus on:

- Hydrological and Water Quality Modelling
- Integrated Water Resources Management
- Application of GIS and Remote Sensing
- Modelling Techniques to Solve Water Resources Related Problems
- Water and Wastewater Treatment Technologies

Another interest of his research is on Environmental Engineering with the focus on Solid Waste Management, Sustainable Application of Waste Materials for Civil Engineering Applications and Infrastructure, as well as Environmental Impact Assessment and Management.

Emerging TUT scholar among Africa's top 500 researchers



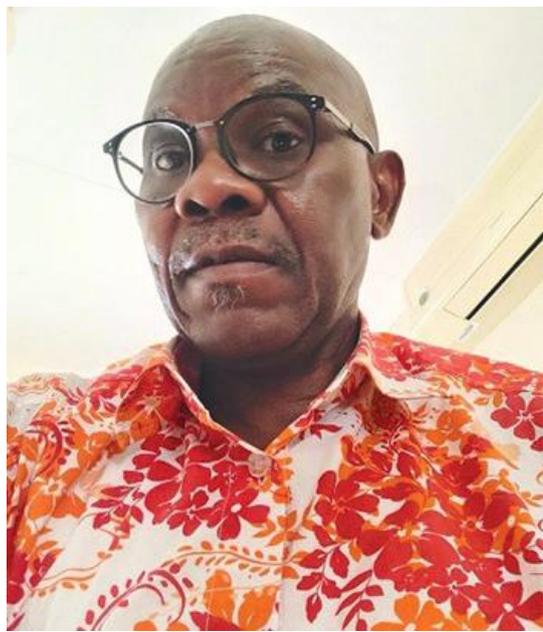
Dr Mxolisi Brendon Shongwe, Head of Chemical, Metallurgical and Materials Engineering and Senior Lecturer at the Faculty of Engineering and the Built Environment has been listed among the top 500 African researchers based on scholarly output between 2015 and 2020.

SciVal, a web-based analytics solution that provides comprehensive access to the research performance of over 20 100 research institutions and their associated researchers from 231 nations worldwide, made the listing. According to SciVal, Dr Shongwe produced 104 scholarly outputs during the assess-

ment period. Dr Shongwe holds a Bachelor of Science Hons. (best final year student), a Master's Degree and a PhD in Metallurgical Engineering, all from the University of the Witwatersrand. He also holds an Advanced Diploma in Vocational Teacher Education from the Haaga-Helia University of Applied Sciences, Finland. Currently he is doing a Master's in Education Management at the Haaga-Helia University of Applied Sciences, Finland.

His research interests are multi-disciplinary, including the development of materials for advanced applications, metallurgical processes, and an understanding of optimisation and simulation of mineral processing plants. His other core research interest is in the management of academic programmes. He has supervised 18 Master's and seven PhD students to completion. He has published four book chapters and more than 130 refereed papers. He has been a reviewer of at least 15 ISI journals in Elsevier, Springer as well as Taylor and Francis.

Emerging TUT scholar among Africa's top 500 researchers



Prof Emmanuel Rotimi Sadiku, a renowned Polymer Scientist and Professor at the Faculty of Engineering and the Built Environment has been listed among the top 500 African researchers by scholarly output between 2015 and 2020.

Prof Sadiku indicates that the tribute is not a one-man show. He acknowledges the contributions of his colleagues, his dedicated students and his postdoctoral research fellows (past and present) who, significantly have contributed to his accomplishment.

Prof Sadiku was also credited with 1,562 citations and an H-index of 31. The H-index is an author level metric measuring the productivity and citation impact of the publications of a scientist or researcher. Rotimi Sadiku is 145th on the list.

The Nigerian-born researcher is well known for his exceptional work in polymer circles in Nigeria, Scotland, Italy, Germany, Sweden, South Africa, and India.

Prof Sadiku obtained a National Diploma in Textile Technology from Kaduna Polytechnic. He then received a scholarship to enrol for a Degree in Fibres and Polymer Science at the University of Strathclyde in Glasgow, Scotland, UK. He also completed his PhD at the same institution.

In addition to his many accolades, he has authored and co-authored many articles and book chapters on aspects relating to polymers. His field of expertise and research specialisation is Material Sciences and Technologies, as well as Polymer Sciences.

Emerging TUT scholar among Africa's top 500 researchers



Prof Patricia Popoola, an outstanding Metallurgical and Materials Engineer and Full Professor at the Department of Chemical, Metallurgical and Materials Engineering, is one of the few women listed amongst the top 500 researchers in Africa by Scholarly Output, between 2015 and 2020.

Prof Popoola is recognised as an exceptional scholar, a multi-talented woman and a perfectionist who exudes passion for research. She has a combination of qualifications that encompasses all areas of Metallurgical and Materials Engineering. She holds a National Diploma in Materials Technology, which deals with the study of Metals, Polymers, Ceramics, Glass, and Cement

Technology. She has a BSc (Honours) Degree in Metallurgical and Materials Engineering, Master's and Doctoral degrees in Metallurgical Engineering. She completed her Doctoral Degree in Physical Metallurgy/Laser Materials Deposition at TUT.

"My research interests are in Advanced Engineering Materials and Surface Technologies. Globally, emphasis have been placed on the development of engineering materials to address the challenges involved in technological development in our society. As such, my research is focussed on the creation of new processes, products, or systems through the development of advanced multifunctional materials. We make use of emerging state-of-the-art technologies to design and fabricate novel materials," she explained.

According to SciVal record, her total scholarly output for the two years is 303, the total citation is 1774 and h-index of 38. To date, she has made a lot of impact with her publications, which have been acknowledged both locally and internationally. Her works have attained high viewership and citations by different authors within the research field /community. Her research collaborations transverse both local and international space.

TUT Engineering Prof improves NRF rating



Prof Thomas Otieno Olwal, a Professor at TUT's Department of Electrical Engineering and the Graduate School of French South African Technical Institute (FSATI), has improved his NRF rating from a Y to a C category. Described as an incisive scholar, Prof Olwal holds two Doctoral Degrees - a PhD in Computer Science from the Université Paris-Est, Champs-sur-Marne, France, and a DTech in Electrical Engineering (Telecommunication Specialisation) from TUT. Prior to joining TUT in 2014, Prof Olwal worked at the Council for Scientific and Industrial

Research (CSIR) as a Senior Researcher in the Broadband Wireless Networks Competency area for seven years. Prof Olwal has more than a decade of experience in research projects, leadership, teaching, and learning. He has demonstrated notable achievements in a number of workplace key results areas and has supervised/mentored more than 20 postgraduate students and/or young researchers since 2009.

He has published more than 130 technical and scientific research outputs in peer reviewed accredited journals, book chapters and conference papers, covering the broad fields of wireless mesh, free-space optical communications, 3GPP (3rd Generation Partnership Project) mobile cellular network standards, wireless sensor networks and the Internet of Things. Prof Olwal's research direction is inspired by a seamless, inclusive, and universal internet of everything (IoE) in the 5G networks and beyond, as enablers for sustainable development in developing economies by 2030 and beyond after that.

In his plethora of research and development contributions towards achieving this vision, Prof Olwal applies numerous scientific and engineering complex problem solving models, tools, and techniques. These include distributed algorithms, computational agent-based modelling, cognitive radio networks, software defined networks, decentralized decision making, emergence and self-organization, autonomous systems, cooperation, optimization, behavioural ecology, and biomimicry to solve real-world challenges in Sustainable Health, Water, Energy, Spectrum, Agriculture and Climate Change (SHWESAC).

Research passion sustains Prof's C-rating



Prof Shengzhi Du, Full Professor at the Department of Electrical Engineering, has sustained his prestigious C-rating from the NRF. He brings with him an exceptional combination of research and executive leadership experiences that cut across industry and academia. Prof Du's passion for research is clear from a variety of projects in which he has been involved. These include: Disabled Enabling System at F'SATI; Auto controlling system research of micro-array gene chip sampling machine for the Scientific Foundation of Tianjin City in China; Brain

Computer Interface based on EEG Technology; Assistive living environment based on biology signals; Digital Topology/Morphology and the Application in Hough Transform; and Human-Machine Systems. Prof Du is a recognised supervisor for postgraduate students, author, and co-author of numerous publications. He enjoys serving on advisory boards, reviewing manuscripts, networking and sharing his knowledge with fellow researchers. He has graduated more than 20 Master's and Doctoral students and published more than 120 papers in international journals and presented at conferences.

In addition to his many accolades, Prof Du has developed five outstanding commercial industry software products.

His field of expertise and specialisation are Electrical Engineering and Mechanical Engineering with a special focus on:

- Hybrid System of Bio-signal and Mechatronics
- Statistic Pattern Recognition
- Image Recognition
- Artificial Intelligence
- Brain Computer Interface (BCI)
- Mechatronics System Modelling and Control
- Human-Machine Systems
- Collaborative Robots

As well as relevant industry applications.

TUT cements longstanding F'SATI partnership



TUT recently hosted the F'SATI Executive Management Board to cement the longstanding beneficial partnership with both South African and French partners.

The F'SATI is currently based at TUT and the Cape Peninsula University of Technology (CPUT) and was jointly developed by the French and South African Governments. The F'SATI initiative was launched early in 1994 after a visit by the late former President Nelson Mandela to France, arranged by the Chamber of Commerce and Industry Region Paris Ile-de-France (CCIR-IDF) with the objective of developing a training institute in electronics, in South Africa.

Speaking about F'SATI, the Deputy Vice-Chancellor: RIE, Dr Vathiswa Papu-Zamxaka, mentioned that the University has benefited greatly on the partnership with F'SATI. "F'SATI is considered a national asset that contributes to the creation of knowledge and the transfer of technology in South Africa by establishing collaboration with

other higher education and research institutes. We remain grateful for the partnership, which was echoed in the meeting. Indeed, the collaborations and beneficial relations have brought greater synergy between the South African and French Institutions and is leading to the evolution of domains to other disciplines such as Management. It is significant to mention that our students and staff continue to benefit from the programme” said Dr Papu-Zamxaka.

Over the years, the objectives of the Institute have continued to be relevant to its ethos and aspirations. The benefits of the F’SATI programmes are clearly aligned with national policy, which aims to increase the number of students and supervisors, to improve the quality of education, and to promote international exposure.

The following are objectives of the Institute:

- Be an Internationally Recognized Research and Innovation Centre in Africa
- Promote International Activities
- Establish Active Industrial Partnerships
- Promote the Exchange of Staff and Students

Dr Papu-Zamxaka added that the programme has made significant contributions to human capacity development over the last 15 years, which include: “graduating 120 Master’s and 40 Doctorates. Through its collaboration with various French Academic Partners, it has also contributed to the graduation of 21 Joint Doctorates and 140 Collaborative Master’s. The programme has also contributed to ten TUT staff members completing their Joint Doctorates while nine staff members completed their Collaborative Master’s. Furthermore, through joint research, the programme has contributed to over 1300 research outputs, nine patents being filed, and an Augmented Mobility start-up being established.

Gibela Research Chair launch promotes strategic partnerships



Collaboration and strategic partnerships were the order of the day at the launch and 5-year celebration of the Gibela Research Chair in Manufacturing and Skills Development. The event took place at the Capital Hotel on Friday, 3 September 2021. The event was attended by senior management from both TUT and Gibela Rail, together with captains of industry.

TUT's Gibela Research Chair hosts fascinating prototype exhibition



The Gibela Research Chair in Manufacturing and Skills Development hosted a first of its kind exhibition that showcased remarkable prototypes derived from its multi-million rand funded research. The event took place at the Gibela Rail Transport Consortium factory in Nigel, on 30 August 2021.

The objectives of the Chair are to:

- facilitate railway-specific skills development to provide capacity for the railway industry;
- expand the scientific research and innovation capacity of South Africans in the fields of railway industry and manufacturing;
- improve South Africa's international research and innovation competitiveness, while responding to the social and economic challenges of the country;
- attract and retain excellent researchers and scientists;
- increase the production of Master's and Doctoral graduates; and
- create research career pathways for young researchers with a strong research, innovation and human capital development output plan.



The value of the research chair is R25 million over five years.

- increase the production of Master's and Doctoral graduates; and
- create research career pathways for young researchers with a strong research, innovation and human capital development output plan.

RESEARCH OUTPUTS 2021

The total number of outputs generated has declined from 143.50 units in 2020 to 94.85 units in 2021. The contributions by the respective environments are listed in the following table.

2021 PUBLICATION UNITS PER DEPARTMENT				
DEPARTMENT	ACCREDITED JOURNAL ARTICLES	CONFERENCE PROCEEDINGS	BOOKS/ CHAPTERS IN BOOK	TOTAL UNITS
Architecture and Industrial Design			1.00	1.00
Building Sciences	1.50			1.50
Chemical, Metallurgical and Materials Engineering	33.84	4.93		38.76
Civil Engineering	3.69			3.69
Electrical Engineering	27.91	5.03		32.94
Geomatics	1.33			1.33
Industrial Engineering	3.18			3.18
Mechanical and Mechatronics Engineering	11.44	1.00		12.44
TOTAL	82.89	10.96	1.00	94.85

RESEARCH OUTPUTS 2021

The Faculty is honoured to host a number of rated NRF researchers. A summary of the rated researchers is provided below:

2021 NRF RATED RESEARCHERS					
	Staff member	Department	Gender	Race	Category
1	Akuru UB Dr	Electrical Engineering	Male	Black	Y
2	Desai DA Dr	Mechanical and Mechatronics Engineering	Male	Indian	C
3	Djouani K Prof	Electrical Engineering	Male	White	C
4	Du S Prof	Electrical Engineering	Male	Chinese	C
5	Mhike W Dr	Chemical & Metallurgical and Material Engineering	Male	Black	Y
6	Mpofu K Prof	Industrial Engineering	Male	Black	C
7	Onyango MS Prof	Chemical & Metallurgical and Material Engineering	Male	Black	C
8	Olwal TO Prof	Electrical Engineering	Male	Black	C, upgraded from Y
9	Osman AOS Prof	Architecture and Industrial Design	Female	Black	C
10	Popoola API Prof	Chemical & Metallurgical and Material Engineering	Female	Black	C
11	Sadiku ER Prof	Chemical & Metallurgical and Material Engineering	Male	Black	C
12	Snyman J Prof	Civil Engineering	Male	White	C
13	Steyn GS Prof	Building Sciences	Male	White	C

Postgraduate student registrations for 2021

The Faculty is honoured to host a number of rated NRF researchers. A summary of the rated researchers is provided below:

2021 NUMBER OF REGISTERED STUDENTS							
Department	Masters			Doctoral			TOTAL
	Female	Male	Total	Female	Male	Total	
Architecture and Industrial Design	24	47	71	4	5	9	80
Building Sciences	21	17	38			0	38
Chemical, Metallurgical and Materials Engineering	32	51	83	10	31	41	124
Civil Engineering	17	22	39	1	5	6	45
Electrical Engineering	4	37	41	4	31	35	76
Industrial Engineering	41	76	117	4	8	12	129
Mechanical and Mechatronics Engineering	4	27	31	1	14	15	46
TOTAL	143	277	420	24	94	118	538

Graduations for 2021

During 2021, a total of 21 Doctoral and 74 Master's students graduated with qualifications from the Faculty of Engineering and the Built Environment.

2021 Graduations per Department							
Department	Masters			Doctoral			TOTAL
	Female	Male	Total	Female	Male	Total	
Architecture and Industrial Design	6	12	18				18
Building Sciences	7	2	9				9
Chemical, Metallurgical and Materials Engineering	8	7	15	5	4	9	24
Civil Engineering	1	1	2				2
Electrical Engineering	3	11	14		7	7	21
Industrial Engineering	4	4	8	1	1	2	10
Mechanical and Mechatronics Engineering	3	5	8		3	3	11
TOTAL	32	42	74	6	15	21	95



FACULTY OF HUMANITIES

16. FACULTY OF HUMANITIES

The highlights were as follows:

- The Faculty managed to publish 106 accredited DHET articles that were captured on Clarivate Converis. The increase of publications could most probably be connected to motivated staff and promotions that were awarded during the 2021 academic year.

• The following staff were promoted:

Prof T de Jager (Educational Foundation) - Full Professor

Prof T Ditsele (Applied Languages) - Associate Professor

Prof RM Mukonza (Public Management) - Associate Professor

Prof CGA Smith (Applied Languages) - Associate Professor

Prof MP Rankhumishe (MSBE) - Associate Professor

- NRF Rated Researcher

Prof T de Jager was awarded a C2 rating by the NRF in January 2021 to December 2026

- Masters and Doctoral Graduations

- Humanities managed to successfully graduate 56 Master's and 18 Doctoral students during the 2021 autumn and spring graduations.

- The enrolment number for all postgraduate qualifications (Honours, Master's, Doctoral, and postgraduate diplomas (PG)) were 887 for the 2021 academic year of which 419 registered for the first time in 2021. The 2021 FTE female numbers were 253 as compared with male PG (166) student enrolments. This shows an increment in female PG numbers.

- The Department Technology and Vocational Education hosted an international online conference, and two public online lectures were held by the Faculty.

- Atlas.ti workshops and research seminars for women, were held to develop and enhance women research capacity.

Five postdoctoral fellowships were awarded to the candidates listed below. Their publications totalled 26 by the end of 2021.

NAMES & SURNAME	HOST	DEPARTMENT	NUMBER OF PUBLICATION	DURATION
Dr T.A Chauke	Dr KS Malatji	Primary Education	26	2020 -2021
Dr Mhlongo	Prof S. Maile	Educational Foundation	1	2019-2021
Moloi Q	Prof A. Kanjee	Primary Education (SENEX FUNDED)	3	2018-2021
Dr ME Kgwete	Dr KS Malatji	Primary Education	2	2019-2020
Moila O	Prof A MJI & Dr S. Mnisi	Dean's office	4	2019-2022
Total			36	

- In the Faculty of Humanities, the School of Education works in partnership with other national universities and the British Council to create and pilot the development of student and teachers' skills in the application of inclusive education in schools. The partnership will continue with phase 2 in 2022 and 2023 in the form of a research project with Prof Sayed as project leader and Prof de Jager and Dr Mokgosi as co-leaders.

- The Department of Safety and Security Management signed a Memorandum of Understanding with Security Watch Africa. The aim is: to identify the matters of Governance and Leadership within the security domain and participate in joint projects to develop capacity. Security Watch Africa Capacity will work closely with TUT to participate in the development of courses and material to develop Policing and Traffic capacity within the security domain.

- Additionally, the Department of Safety and Security Management signed an Memoran-

dum of Understanding with the International University of Management and Administration (IUMA) IUMA identifies the need for closer collaboration with the TUT on matters related to campus and school crimes in learning communities and to participate in joint projects to develop capacity and sustainable solutions to these identified challenges.

The challenge experienced was that Clarivate Converis was not functioning properly and only 87 of the 106 DHET accredited articles that were submitted reflected on the system and 19 were omitted. Articles that were not captured were entered manually by the Research Officer. No book chapters and conference proceedings were submitted by researchers despite numerous requests to submit. This contributed to no book chapters and conference proceedings subsidy claims by the Faculty.

Additionally, DHET penalised institutions for submitting articles published in predatory journals, even if they appeared on the DHET-accredited list. Another issue that was raised is that proof of ethical clearance is mandatory.

The DHET Committee recommended to ensure all accredited journals are subsidised to:

- Enhance quality control of publications as DHET Department reserves the right to withhold payment of research output subsidy in respect of claims that do not meet the criteria as outlined in the Research Outputs Policy and where the Department has found evidence of unethical conduct relating to the claims.
- Ensure that an appropriate framework and procedures are in place to ensure the quality and integrity of publications that opt to receive subsidy.

Headcount Enrolments by Qualification Type

Qualification Type	Headcount Enrolments				
	2017	2018	2019	2020	2021
Diplomas and Certificates	9,399	9,698	9,336	9,274	9000
Degrees	4,828	5,181	5,430	4,261	3,527
Undergraduate Total	14227	14879	14766	13535	12527
Honours	570	795	776	355	322
Masters	330	380	475	517	119
Doctoral	89	105	112	131	347
Other Postgraduate	0				40
Postgraduate Total	989	1280	1363	1003	828
Occasional	4	32	5		2
Total	15,220	16,191	16,134	14,538	13,357

Graduates by Major Field of Study

Major Field of Study	Graduates				
	2017	2018	2019	2020	2021
BUS MAN					12
EDUCATION	941	836	1,229	1,245	1119
OTHER HUM	2,787	2,492	3,126	2,544	2,966
SET					
Total	3,728	3,328	4,355	3,789	4,097

Qualification Type	Graduates				
	2017	2018	2019	2020	2021
Diplomas and Certificates	1,984	1,775	2,327	2,226	2,906
Degrees	1,505	1,476	1,573	1,211	1,014
Undergraduate Total	3,489	3,251	3,900	3,437	3,920
Honours	185	35	387	268	77
Masters	39	31	50	59	50
Doctoral	13	11	18	25	22
Other Postgraduate	2				28
Postgraduate Total	239	77	455	352	177
Occasional	0	0	0		
Total	3,728	3,328	4,355	3,789	4,097

Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
E-Bangi Journal (Malaysia)	Reframing the notion of Regional Integration in Sub-Saharan Africa: What role for Civil Society?	Mlambo DN		
Solid State Technology	Integrating E-Learning into teaching and learning: Student's perspective in one rural based South African university.	Thosago JM,	Malatji KS &	Kgwete ME
Life's Science Global	Critical Analysis of strategies Towards Creating an Adequate Level of Awareness on Cybercrime among the youth in Gauteng Province	Aphane MP,	MOFOKENG , JT	
African Renaissance	Exploring the role of youth work in the fight against the novel coronavirus in Cape Town	<u>Chauke TA</u>		
<u>African Journal of Development Studies (formerly AFFRIKA Journal of Politics, Economics and Society) Vol. 10, No. 4</u>	Revisiting Community Engagement: Universities in the Paradoxical Context of Contemporary Scholarship in South Africa	Molepo JN,	Mudau J,	

Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
The Journal for Transdisciplinary Research in Southern Africa	South African Association of Public Administration & Management	South Africa's Post-Apartheid Economic Policy Odyssey and its Implication for Foreign Direct Investment.	Faku M E,	Moeti K.B
Journal of Educational studies	Implementation of an E-Learning project in the Tshwane South District: Examining the state of readiness of teachers and learners.	<u>MSIZA G,</u>	<u>MALATJIK,</u>	<u>MPHAHLE LE L</u>
Cogent OA	Modelling fashion clothing involvement among gay consumers in South Africa	<u>Madinga WM,</u>	<u>Mazriri ET</u>	<u>Dondolo HB & Chuchu T</u>
Africa's Public Service Delivery and Performance Review	Utilisation of digital central supplier database in enabling electronic procurement in the Limpopo Provincial departments	Mpehle Z,	Mudogwa RM	
African Renaissance	The role of Zimbabwe Parliament in Its Interface with the Executive in Foreign Policy Decision-Making: The Case of Zimbabwe's withdrawal	<u>Gwakara C,</u>	<u>Meshie Z</u>	<u>Mukonza RM</u>

Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
Scientia Socialis	Economics Teachers' use of Topic Specific Pedagogical Content Knowledge in Teaching Market Dynamics	Ogbonnaya IC,	MJI A	MAFA - THELEDI O & NGULUBE B
The journal for interdisciplinary research in Southern Africa	An examination of the challenges of quality water provision in Madibeng local municipality, North west Province	RANNGU J,	MUKONZA R	
African Journal of Science, Technology, Innovation and Development	Introduction of an electronic petition system in the City of Tshwane - A municipal residents' perspective	<u>Malemela EQ.</u>	<u>Mukonza RM</u>	
<u>South African Journal of Childhood Education</u>	Teacher's understanding and use of visual tools in their numeracy classrooms: A case study of two primary schools in Gauteng.	<u>SMITH C.</u>	<u>CEKISO M</u>	
Journal for Learning Teaching	Investigating reading comprehension strategies used by teachers during English first additional language reading instruction	<u>OLIFANT F.</u>	<u>CEKISO M</u>	

Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
South African Association of Public Administration & Management	South Africa's Post-Apartheid Economic Policy Odyssey and its Implication for Foreign Direct Investment	<u>Monde E</u>	<u>Faku</u>	<u>Moeti KB</u>
The Oriental Anthropologist	Punishment of Crime in Nigeria and South Africa: Some Perspectives on Capital Punishment	<u>OLUTOLA A</u>		
African Journal of Development Studies (AJDS)	Student Mobility, Brain Drain and the Internationalisation of Higher Education in Southern Africa	<u>Mlambo VH,</u>	<u>Ogunnubi O,</u>	<u>Mlambo DN</u>
World Institute for Engineering and Technology Education (WIETE)	Challenges faced by lecturers in the use of fourth industrial revolution tools to equip pre-service teachers in a South African university.	<u>Moila ON,</u>	<u>Mji A</u>	<u>Simelane-Mnisi S</u>
World Institute for Engineering and Technology Education (WIETE)	Complexities in the implementation of fourth industrial revolution tools to equip per-service teachers in a South African university.	<u>Olifant, T</u>	Cekiso, M.P	Rautenbach, E
TURKISH SCIENCE EDUCATION	<u>Attitude and Performance: A universal Co-Relation, Example from a Chemistry Classroom</u>	<u>Simelane-Mnisi S,</u>	<u>Chowdhury P,</u>	<u>RANKHUM ISE MP,</u> <u>MNISI S,</u> <u>MAFA -</u>

Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
Scientia Socialis	Undergraduate Economics Curriculum and Employability Skills in South Africa	<u>NGULUBE B</u>		
African Renaissance	Inter-governmental Relations in Mopani District Municipality, South Africa-An Empirical Review	<u>Shopola MA,</u>	<u>Mukonza RM</u>	
African Journal of Gender, Society and Development	Youth Apathy in an Electoral Democracy: A Critical Discourse on Civil Participation in South Africa	<u>Chauke TA,</u>	<u>Malatji KS</u>	
African Journal of Research in Mathematics, Science and Technology Education	Changes in Learners' Perspectives on the nature of Mathematics after Participating in a Mentorship Programme	<u>Ndlovu W,</u>	<u>Pournara C</u>	<u>Mwakapenda WWJ</u>
CRIMSA	Middle Managers' Influence as role Models upon Employees' Morale in the South African Police Service	<u>Melwich W.A,</u>	<u>Mofokeng J.T</u>	
CRIMSA	The marriage of convenience between the South African Police Service and the National Defence Force: The COVID-19 Experience in the Spectacle of National Disaster.	<u>Mkhwanazi Z.M,</u>	<u>Bello P.O,</u>	<u>Khosa D & Olutola A.A.</u>

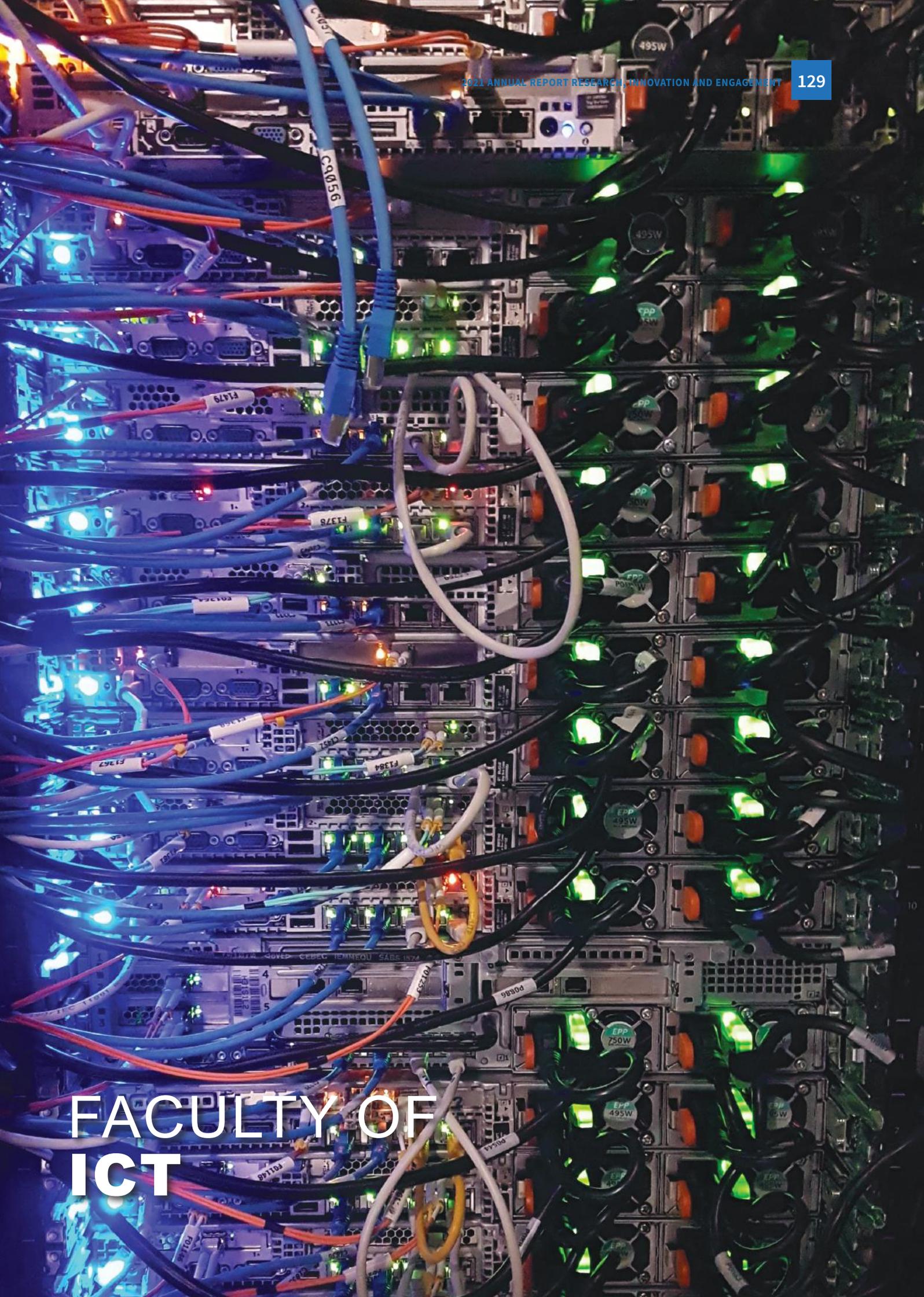
Title of Journal	Title of Article	1st Author	2nd Author	Other Authors
SOCIOLINGUISTIC STUDIES	Personal names as communicative tools in Tshivenda: Cultural-historical perspectives	<u>Mandende I.P</u>	<u>Cekiso M.P.</u>	
South African Journal of Childhood Education	Teacher's understanding and use of visual tools in their numeracy classrooms: A case study of two primary schools in Gauteng.	<u>Smith C.G.A</u>	<u>Cekiso M P</u>	
Rwodzi C, de Jager L, Mpofu N	The innovative use of social media for teaching English as a second language.	<u>Rwodzi C,</u>	<u>de Jager L,</u>	<u>Mpofu N</u>
EURASIA JOURNAL OF MATHEMATICS SCIENCE AND TECHNOLOGY EDUCATION	A Proposal to Integrate the Management of Electronic Waste into the Curriculum of Primary Schools	<u>de Jager T</u>		
JOURNAL OF SCIENCE TEACHER EDUCATION	Student Teachers' Perspectives on Chemistry Education in South Africa and Finland	Keinonen T,	<u>de Jager T</u>	
EDUCATIONAL STUDIES	Profile of South African secondary-school teachers' teaching quality: evaluation of teaching practices using an observation instrument	<u>de Jager T,</u>	<u>Coetzee MJ,</u>	Maulana R, Helms-Lorenz M, van de Grift W
African Journal of Gender, Society and Development	Personal names as communicative tools in	<u>MANDENDE I,</u>	<u>CEKISO M,</u>	<u>RWODZI C</u>

Funding for Research

Type of output	Amounts
Research output publications	R 1, 763 208.34
Masters and doctoral outputs	R 1, 748 064.79

Qualification Improvement

Title	First name	Surname	Faculty	Department	Category of nomination
Dr	Nokuthula Getrude	Mbatha	Humanities	Applied Languages	Improvement of Qualification
Dr	Maria	Mushatooni	Humanities	Applied Languages	Improvement of Qualification
Dr	Yanga Lusanda Praiseworthy	Majola	Humanities	Applied Languages	Improvement of Qualification



FACULTY OF ICT

17. FACULTY OF ICT

Research Outputs Publications

The research activity in the Faculty saw a noticeable improvement during the previous five years, despite the Covid-19 outbreak and restrictions in the past two years. Staff and students were able to participate in conferences virtually and also to publish in accredited journals.

Accredited research output

Publication units				
Year	Journal article	Conference proceedings	Books	Units
2017	1.00	9.05	0.00	10.05
2018	4.5	12.78	2.65	19.95
2019	11.48	6.67	0.00	18.15
2020	8.36	15.48	0.00	24.02
2021	12.67	9.72	0	22.39

***2021 Research outputs still need to be reviewed by DHET.**

RESEARCH CAPACITY BUILDING

The Department of Computer Systems Engineering (CSE) and the Department of Information Technology (IT) jointly hosted a successful virtual workshop with title CSE-IT DRC: 2021 Computer Systems Engineering and Information Technology DRC Postgraduate Research Workshop (CSE-IT PRW2021), for their postgraduate students, providing them with an opportunity to showcase their research projects. The aim of the workshop was to bring together their postgraduate students to exchange and share their experiences and research results.

Two HODs from CSE and IT, two postdoctoral fellows, eight doctoral students, and 15 Master's students from CSE and IT presented during the workshop. Over 50 students and staff members attended this workshop. The funding for rewarding outstanding presenters at the workshop was provided by the Department of Computer Systems Engineering's research funds.

ENGAGEMENT WITH OTHER UNIVERSITIES AND OTHER FACULTIES AT TUT

International university engagement:

Erasmus+KA107 programme: Staff Exchange Mobility Project 2020-2023 - Polytechnic University of Valencia (UPV-Spain).

National university engagement:

NRF-Postdoctoral collaboration Joint Project – University of Mpumalanga and Kebangsaan – Malaysia (UKM).

University Staff Doctoral Programme (Academic Doctoral Advancement Programme Towards Transformation) - ADAPTT 2018-2022: collaborating universities - University of Western Cape (UWC), TUT, University of Forte, CPUT and Rhodes University – University of Missouri (USA), University Illinois (USA) – Mentorship programme.

Prof Pius Adewale Owolawi built the research collaborations with the University of Kwa-Zulu-Natal, Durban University of Technology, University of Pretoria, University of Johannesburg, Tennessee Tech University, Cookeville, USA: Department of Electrical and Computer Engineering, University of California, San Diego, USA: Department of Electrical and Computer Engineering, Norfolk State University, USA: Department of Computer Science, as well as the Memorial University, Canada: Faculty of Engineering and Applied Science.

Prof Pius Adewale Owolawi and Prof Chunling Tu were also involved in the intelligent agriculture project from the Faculty flag project and industry.

POSTGRADUATES (ENROLMENTS AND GRADUATIONS)

- PGDip: 155
- M Comp: 132
- D Comp: 24
- Total: 311

Graduations

- M Tech: 7
- M Comp: 10
- D Tech: 1
- D Comp: 3
- Total: 21

ACADEMIC DEPARTMENTS

Departments

- Department of Computer Science
- Department of Computer Systems Engineering
- Department of Informatics
- Department of Information Technology

Academic Units

- ICT First Year Foundation
- End User Computing

Niche Areas

- ICT for Development, Niche Area Leader Dr EA van Wyk
- ICT for Business Enhancement, Niche Area Leader Dr TJ Lavhengwa

RESEARCH EXCELLENCE AWARDS

Faculty Awards 2021

The Faculty rewarded staff members who engaged in research, either as individuals or as a member of the research group. For the year 2021, the Faculty nominees were:

Category: Senior Researcher of the Year

- Prof Schultz CM - Senior Researcher of the Year
- Prof Naidoo V - Merit Award Researcher of the Year

Category: Woman researcher of the Year

- Dr Sifolo PPS – Woman Researcher of the Year
- Dr Van Hoek L – Merit

Institutional awards

The colleagues who improved their qualifications in 2021 were recognised at the Academic Excellence Awards.

RESEARCH FUNDING

NRF funding

- Ms B Makopo from the Department of Tourism Management received Thuthuka funding for Doctoral Track.

DHET Academic Exchange Programme

Due to limitations of the movement of people during 2021, no staff member participated in the Academic Exchange Programme.

RESEARCH CAPACITY

The Faculty has taken efforts to improve the capacity among staff members. For 2021, the following training interventions took place



FACULTY OF MANAGEMENT SCIENCE

MESSAGE FROM THE ASSISTANT DEAN: POSTGRADUATE STUDIES, RESEARCH AND INNOVATION



PROF EDWARD RANKHUMISE
Assistant Dean

For the past years, the Faculty has been re-engineering publication trends and increase of postgraduate student success and research outputs. The focus has been on publishing in accredited journals in contrast to conference proceedings.

The Faculty intends to allow the staff members to attend conferences and encourage them to present their papers, and not to publish them in the conference proceedings. It is worthwhile for researchers to publish their work in academic journals to yield a full unit of the research output compared to half a unit if published in the conference proceedings.

The conference attendance is fundamental if we envisage creating collaboration with other scholars from international universities. With this principle in mind, the research in the Faculty continued to improve gradually regardless of all the challenges that we experienced with the Covid-19 pandemic. The Faculty continued to give training interventions to the researchers and over 45 attended the article writing workshops. This was done as a result of the concerns raised in the Faculty Board of August 2021. Though the training interventions were implemented and the visit by the Executive Dean to all the departments, the research contribution is still obtained from the same researchers compared to other previous years.

The main constraint that continues to face the Faculty is the limited capacity to supervise the students, which impacts the graduation rate. For 2021, overall research outputs total of 31.401 were reported compared to 46.581 in 2020, which is a decline of 15.18 units. It should be noted that some of the journal articles were rejected by the Research Outputs Committee for various reasons such as the overlap of articles and conference proceed-

ings with alleged similarity, which was not provided and also the so-called predatory journals. As a Faculty, we will continue to focus aggressively on the publication of articles and interventions such as article writing retreats will be implemented.

DEPARTMENTS AND A BUSINESS SCHOOL

- Department of Business Information Management Services
- Business School
- Department of Hospitality Management
- Department of Management and Entrepreneurship
- Department of Marketing, Supply Chain Management and Sport Management
- Department of Operations Management
- Department of People Management and Development
- Department of Tourism Management

NRF Ratings

Name and Surname	Category
UP Herman	Y 2
PPS Sifolo	Y2
AT Roux	C2

Type of training intervention	Purpose	Duration	Number of attendees	Facilitator	Source of funds
Article writing workshop	To assist staff members and students on how to write articles	5	45	Mr. Ngobeni S	UCD

Of the 45 participants in the retreat, 25 were not submitted to the journals. 20 were submitted to different journals and most of the manuscripts were still under review.

RESEARCH OUTPUTS

Publications: Articles

PUBLICATION UNITS					
Year	Accredited Journal Articles	Non-Accredited Journal Articles	Conference Proceedings	Books/Chapters In Books	Total Units
2009	8	0	11	1	10.59
2010	12	0	16	0	15.44
2011	8	0	34	1	22.67
2012	11	0	20.92	0	31.92
2013	20.18	0	18.25	0	38.43
2014	32.33	0	6	0.32	38.65
2015	43.17	0	7	0	47.54
2016	41.09	0	6.75	0	47.84
2017	34.49	0	13.32	0	47.81
2018	43	14	2.99	3.33	49.32
2019	39.43	0	5.36	0	44.79
2020	46.0810	0	0.50	0	46.581*
2021	28.401	0	1.75	1.25	31.401*

Publication date	Journal name	Title	Surname	Initials
2021	African Journal of Employee Relations (Formerly South African Journal of Labour Relations)	The Relationship Between Employment Relationship, Employment Relations Satisfaction and Psychological Contracts in the South African Public Sector Workplace	Swarts	I
2021	African Journal of Employee Relations (Formerly South African Journal of Labour Relations)	The Relationship Between Employment Relationship, Employment Relations Satisfaction and Psychological Contracts in the South African Public Sector Workplace	Lessing	KF
2021	Journal of Governance and Regulation	Labour regulation in the public sector: Employment relationship, employment relations satisfaction and psychological contract	Swarts	I
2021	Journal of Governance and Regulation	Labour regulation in the public sector: Employment relationship, employment relations satisfaction and psychological contract	Lessing	KF
2021	SA Journal of Human Resource Management	Performance management as a mediator for work engagement and employment relationships in the public sector in South Africa	Maake	G
2021	SA Journal of Human Resource Management	Performance management as a mediator for work engagement and employment relationships in the public sector in South Africa	Harmse	CPJ
2021	SA Journal of Human Resource Management	Performance management as a mediator for work engagement and employment relationships in the public sector in South Africa	Schultz	CM
2021	Tydskrif vir Geesteswetenskappe	Kapasiteitsontwikkeling by geskoolde en hooggeskoolde werklose persone in Pretoria, Gauteng, ten einde hulle indiensneembaarheid en selfwerksaamheid te bevorder.	Smit PK	

2021	Tydskrif Geesteswetenskappe	vir	Kapasiteitsontwikkeling by geskoolde en hooggeskoolde werklose persone in Pretoria, Gauteng, ten einde hulle indiensneembaarheid en selfwerksaamheid te bevorder.	Schultz	C M
2021	Tydskrif Geesteswetenskappe	vir	Kapasiteitsontwikkeling by geskoolde en hooggeskoolde werklose persone in Pretoria, Gauteng, ten einde hulle indiensneembaarheid en selfwerksaamheid te bevorder.	Swartz	I
2021	Tydskrif Geesteswetenskappe	vir	Kapasiteitsontwikkeling by geskoolde en hooggeskoolde werklose persone in Pretoria, Gauteng, ten einde hulle indiensneembaarheid en selfwerksaamheid te bevorder.	Lessing	K F
2021	Tydskrif Geesteswetenskappe	vir	Kapasiteitsontwikkeling by geskoolde en hooggeskoolde werklose persone in Pretoria, Gauteng, ten einde hulle indiensneembaarheid en selfwerksaamheid te bevorder.	Van Hoek	CE
2021	African Journal of Hospitality, Tourism and Leisure		A Conceptual Framework for Corporate Social Responsibility Initiatives for Casinos	Shai	M P
2021	African Journal of Hospitality, Tourism and Leisure		A Conceptual Framework for Corporate Social Responsibility Initiatives for Casinos	Kleynhans	I C
2021	African Journal of Hospitality, Tourism and Leisure		A Conceptual Framework for Corporate Social Responsibility Initiatives for Casinos	Roberson	JR
2021	Indian Journal of Labour Economics		Union Membership as a Moderator in the Relationship Between Living Wage, Job Satisfaction and Employee Engagement	Maleka	M
2021	Indian Journal of Labour Economics		Union Membership as a Moderator in the Relationship Between Living Wage, Job Satisfaction and Employee Engagement	Ragadu	SC

2021	Indian Journal of Labour Economics	Union Membership as a Moderator in the Relationship Between Living Wage, Job Satisfaction and Employee Engagement	Paul Dachapalli	LA
2021	Indian Journal of Labour Economics	Union Membership as a Moderator in the Relationship Between Living Wage, Job Satisfaction and Employee Engagement	Schultz	C M

2021	Indian Journal of Labour Economics	Union Membership as a Moderator in the Relationship Between Living Wage, Job Satisfaction and Employee Engagement	Van Hoek	CE
2021	International Journal of Entrepreneurship	Government contribution towards the growth of Small and Medium-Sized Enterprises: Owners' Perspective	Rankhumise	EM
2021	SA Journal of Human Resource Management	Relationship between organisational commitment and effectiveness of human resource management practices in a South African information technology company	Paul Dachapali	LA
2021	SA Journal of Human Resource Management	Relationship between organisational commitment and effectiveness of human resource management practices in a South African information technology company	Botha	CT
2021	SA Journal of Human Resource Management	The relationship between self-leadership, the future of human resource management, and work engagement	Schultz	CM
2021	SA Journal of Human Resource Management	The relationship between self-leadership, the future of human resource management, and work engagement		
2021	SA Journal of Human Resource Management	The relationship between talent management, transformational leadership and work engagement: An automotive artisan perspective	Smit	PK
2021	SA Journal of Human Resource Management	The relationship between talent management, transformational leadership and work engagement: An automotive artisan perspective	Schultz	CM
2021	SA Journal of Human Resource Management	The relationship between talent management, transformational leadership and work engagement: An automotive artisan perspective	Van Hoek	CE
2021	African Journal of Hospitality, tourism and Leisure (AJHTL)	Making "Sense" of the Middle of the Pyramid (MOP) Consumer's Dining Experience	Kleynhans	IC

2021	African Journal of Hospitality, tourism and Leisure (AJHTL)	Making "Sense" of the Middle of the Pyramid (MOP) Consumer's Dining Experience	Van Heerden	CH
2021	African Journal of Hospitality, tourism and Leisure (AJHTL)	Making "Sense" of the Middle of the Pyramid (MOP) Consumer's Dining Experience	Kleinhans	EH
2021	African Journal of Hospitality, tourism and Leisure (AJHTL)	Students' Motivation for Attending Varsity Football Matches	Van Heerden	CH
2021	African Journal of Hospitality, tourism and Leisure (AJHTL)	Students' Motivation for Attending Varsity Football Matches	Naidoo	V
2021	Journal of Public Administration	An integrated skills development framework for Lepelle northern water	Maleka	M
2021	Higher Education Policy	Toxic Leadership: A Slow Poison Killing Women Leaders in Higher Education in South Africa?	Roux	AT
2021	Journal of Psychology in Africa	Role conflict experiences of South African shop stewards: An exploratory study	Maleka	MJ
2021	Academy of Entrepreneurship Journal	The effect of entrepreneurial motivation on entrepreneurial intention of South African rural youth	Malebana	MJ
2021	African Journal of Hospitality, Tourism and Leisure	Quality Reporting of Mixed Methods Research in Tourism-Related Studies	Van Heerden	CH
2021	African Journal of Hospitality, Tourism and Leisure	Profiling Holiday Home Owners in Namibia	Sifolo	PPS
2021	African Journal of Hospitality, Tourism and Leisure	Profiling Holiday Home Owners in Namibia	Hermann	U P

2021	African Journal of Hospitality, Tourism and Leisure	Wildlife Tourism Motivation: A Case for Manyeleti Nature Reserve, Mpumalanga	Sifolo	PPS
2021	African Journal of Hospitality, Tourism and Leisure	Wildlife Tourism Motivation: A Case for Manyeleti Nature Reserve, Mpumalanga	Du Plessis	L
2021	Emerging Science Journal	Evaluation of Reverse Logistics in Challenges within the Manufacturing Pharmaceutical Companies	Makaleng	MS
2021	Global Media and Communication	Gratifications and readership of women's magazines in South Africa	Roux	AT
2021	International Journal of Energy Economics and Policy	Guiding principles for establishing energy consumption reduction and increase production performance in manufacturing	Eduon	IE
2021	International Journal of Energy Economics and Policy	Guiding principles for establishing energy consumption reduction and increase production performance in manufacturing	Naidoo	V
2021	Journal of Entrepreneurship Education	Relationship between entrepreneurial support, attendance of business information seminars and entrepreneurial intention	Malebana	MJ
2021	Journal of entrepreneurship education	The effects of entrepreneurship education on students' entrepreneurial intentions at a South African university of technology	Malebana	MJ
2021	Journal of Teaching in Travel and Tourism	Values for an Undergraduate Ecotourism Management Curriculum in South Africa: A Mixed-methods Study	Bouwer	S C
2021	Journal of Teaching in Travel and Tourism	Values for an Undergraduate Ecotourism Management Curriculum in South Africa: A Mixed-methods Study	Hermann	U P
2021	Journal of Teaching in Travel and Tourism	Values for an Undergraduate Ecotourism Management Curriculum in South Africa: A Mixed-methods Study	Geldenhuy s	S

2021	Management: Journal of Contemporary Management Issues	The effects of Information and Communication Technology (ICTs) on the efficacy of administrative employees in selected government departments in Gauteng	Mkhomazi	SS
2021	Management: Journal of Contemporary Management Issues	The effects of Information and Communication Technology (ICTs) on the efficacy of administrative employees in selected government departments in Gauteng	Rankhumise	E.M
2021	SA Journal of Human Resource Management	A study of job satisfaction and work engagement at the National Treasury of South Africa	Naidoo	V
2021	SA Journal of Human Resource Management	The future and the role of human resource management in South Africa during the Fourth Industrial Revolution	Schultz	CM
2021	SA Journal of Human Resource Management	Predictors of affective commitment at municipalities in the Nkangala District, Mpumalanga.	Maleka	MJ
2021	SA Journal of Human Resource Management	Predictors of affective commitment at municipalities in the Nkangala District, Mpumalanga.	Skosana	T B
2021	SA Journal of Human Resource Management	Predictors of affective commitment at municipalities in the Nkangala District, Mpumalanga.	NGonyama-Ndou	TL
2021	IJEED	Covid-19 effect on Business Performance: SMMEs perspectives in a South African Context	Sifolo	PPS
2021	Technium Social Sciences Journal	An assessment of interest rates on high income earners in South Africa	Eduon	IE
2021	Technium Social Sciences Journal	An assessment of interest rates on high income earners in South Africa	Naidoo	V

Title of Proceeding	Title of contribution	1 st Author
SAIMS	Essential future developmental areas for human resource managers post-Covid-19	Schultz CM
IBC	Challenges faced by shop stewards in two South African Unions	Maleka MJ
INTERNATIONAL CONFERENCE ON PUBLIC ADMINISTRATION AND DEVELOPMENT ALTERNATIVES (IPADA)	Low-Income Worker's Perceptions About a Living Wage in the Tshwane Municipality	Maleka MJ

Title of Proceeding	Title of chapter	1 st Author
Culture and Rural-Urban Revitalization in South Africa	Cultural Tourism: Serendipity or Low Hanging Fruits?	Sifolo PPS
Future of Work, Work-Family Satisfaction, and Employee Well-Being in the Fourth Industrial Revolution	Fourth Industrial Revolution (4IR) in the Global South: The Future of Work in Tourism – Challenges, Opportunities and Future Prospects	Sifolo PPS
Future of Work, Work-Family Satisfaction, and Employee Well-Being in the Fourth Industrial Revolution	Fourth Industrial Revolution (4IR) in the Global South: The Future of Work in Tourism – Challenges, Opportunities and Future Prospects	Henama US

Conclusion

The Faculty has declined the publication of articles. Five conference proceedings were reported and three were recommended to DHET. Three chapters were recommended. We are optimistic that the outputs will improve further in 2022. The academic staff should be encouraged to meet the minimum requirements of 0.5 units per year.



FACULTY OF **SCIENCE**

19. FACULTY OF SCIENCE

EXECUTIVE SUMMARY AND HIGHLIGHTS

The Faculty of Science consists of 14 academic departments:

- Department of Animal Sciences
- Department of Biomedical Sciences
- Department of Biotechnology and Food Technology
- Department of Chemistry
- Department of Crop Sciences
- Department of Environmental Health
- Department of Environmental Water and Earth Sciences
- Department of Horticulture
- Department of Mathematics and Statistics
- Department of Nature Conservation
- Department of Pharmaceutical Sciences
- Department of Physics
- Department of Sport, Rehabilitation and Dental Sciences
- Department of Adelaide Tambo School of Nursing Science

2021 HIGHLIGHTS

Research is the quintessential force driving our evolution and the driving force in the Faculty of Science. The Faculty of Science has 14 departments, which are divided into three streams: Health Sciences, Animal and Agricultural Sciences and Natural Sciences. All the streams have consistently demonstrated their quality research output and are recognised for this across various publications and output. The streams also represented the University in many national and international conferences and procured external funding for research projects. The Faculty prides itself in its highly-rated researchers. In 2021, we had a postgraduate headcount of 122 Doctoral students and 287 Master's students.

The Faculty also participated in outreach and community engagement e.g. Ndumo outreach programme, Stimulated Agribusiness Accelerated programme, KOSTA Foundation, Glendale community programme and TUT Vaccination site to name a few. Many of our researchers such as Prof Momba and Prof Katerere appeared on television, radio interviews and newspapers showcasing the highlights of their research and innovation. The Faculty has published 114 papers and zero book chapters and books.

The Faculty of Science thus has a proud tradition of academic excellence and our researchers continue to help with the creation of African-based solutions to global problems, including issues relating to climate change, urbanisation, education and health, to name just a few. Many researchers in the Faculty are recognised leaders in their respective fields, which means that you will continually be exposed to their latest scholarly work and research discoveries. The Faculty prides in having the following accolades:

Five of the research chairs are hosted within the Faculty of Science, these are:

DST/NRF SARCHI Chair Acid Mine Drainage

DST/NRF SARCHI Chair Agrochemurgy and Plant Symbioses

DST/NRF SARCHI Chair Phytochemical Food Network to improve Nutritional Quality for Consumers

DST/NRF SARCHI Chair Phytomedicine

The Faculty has two research platform chairs, in the following areas:

- Pharmaceutical and Biotech Advancement in Africa
- Photovoltaic Nanocomposites

The Faculty has one Niche Area: Material composites.

The Faculty had 22 rated researchers made up of B Rated – 2 Staff members, C- Rated – 18 Staff members and Y Rated – 2 Staff members.

Faculty Research Day

The Faculty of Science hosted a virtual Research Day on 21 October 2021. In 2021, we created an extraordinary space for us to gather (virtually), discuss, and exemplify the remarkable research accomplishments of our staff and students to the attendees within South Africa and abroad.

FACULTY RESEARCH DAY WINNERS

Oral presentation Award: Agriculture Sciences: Ms Tiisetso Mpai

Oral presentation: Natural Science category: Ms Mandisa Mangisa

Oral presentation Award: Health Science – Ms Yvonne Ngcobo

Poster presentation Award: Health Science – Mr Jabu Lonwabo Maselela

ACADEMIC EXCELLENCE AWARDS

The following staff members were nominated for the Academic Excellence Awards for outputs in 2021:

- Prof Retha Slabbert – Winner: Women Researcher of the Year
- Prof Lutendo Sylvia – Runner: Women Researcher of the Year
- Prof Leshweni Jeremia Shai – Winner: Researcher of the Year
- Prof Michael Shatalov – Runner: Researcher of the Year
- Dr Takalani Judas – Winner: Young Researcher of the Year
- Dr Resoketswe Charlotte Moropeng – Runner: Young Researcher of the Year

IMPROVEMENT OF QUALIFICATIONS

The following staff members improved their qualifications in 2021:

- Dr Tlangelani Nghondzweni – Improved Doctoral Qualification
- Dr Paulina Mabusela – Improved Doctoral Qualification
- Dr Carin Boshoff – Improved Masters Qualification (Haaga Helia)
- Dr Mathoto Thaoge - Improved Masters Qualification (Haaga Helia)
- Prof Ingrid Mokgobu- Improved Masters Qualification (Haaga Helia)
- Prof Yolanda Havenga - Improved Masters Qualification (Haaga Helia)
- Prof Yvonne Paul – Improved Masters Qualification (Haaga Helia)
- Ms Pearl Ignacia Boshof – Improved Masters Qualification
- Ms Susan West – Improved Masters Qualification
- Mr Hlulani Alloy Nghayo – Improved Masters Qualification
- Mr Lesibana Godfrey Maguga – Improved Masters Qualification

NRF RATED RESEARCHERS

The Faculty has the following rated researchers:

- B Rated – 2 Staff member
- C Rated – 18 Staff member
- Y Rated – 2 Staff members

REGISTRATIONS 2021	
MASTERS	287
DOCTORAL	122
TOTAL	409
GRADUATIONS 2021	
MASTERS	82
DOCTORAL	16
TOTAL	98

Publication Units				
Year	Journal Articles	Conference Proceedings	Books	Total Units
2021	72,93	0.0	0.0	72,93

NICHE AREAS

• 1 Niche area - Material Composites

CENTRES, INSTITUTES, TECHNOLOGY STATIONS AND INCUBATORS (CITSIs)

The Faculty of Science consists of the following CITSIs:

- Centre of Tissue Engineering
- Centre for Environmental Health
- Centre of Applied Chemistry



Tshwane University of Technology

We empower people

