LEADING AFRICA INTO THE FOURTH INDUSTRIAL REVOLUTION TO SOLVE FUTURE CHALLENGES
CONTENTS

LEADING AFRICA INTO THE FOURTH INDUSTRIAL REVOLUTION TO SOLVE FUTURE CHALLENGES .......................... 4
On course to challenge the global elite ........................................ 4
The community we serve at UJ ............................................... 5

BUILDING A CULTURE OF GLOBAL EXCELLENCE AND STATURE .................................................. 6
The University of the Future ...................................................... 6
UJ’s Global Excellence and Stature ........................................ 8
Flagship Institutes and Programmes ........................................ 10
GES Institutes ........................................................................ 10
The Institute for Intelligent Systems ......................................... 10
Institute for Pan-African Thought and Conversation ......................... 11
The Johannesburg Institute for Advanced Study ................................. 13
The University of Johannesburg .................................................. 14
Confucius Institute ................................................................. 14
GES Programmes ................................................................. 16
Early Childhood Development ................................................... 16
Earth Sciences ........................................................................ 20
Graduate School of Architecture ............................................... 22
International Commercial Law .................................................. 24
Nanotechnology and Water ....................................................... 25

PARTNER WITH US IN REIMAGINING OUR FUTURE ................................................................. 26
As well as being an institution that prides itself for its accessible excellence, UJ has also established itself as an institution of global excellence and exceptional stature.

UJ is the first and only African university admitted to the highly respected consortium of 28 research-intensive universities in the world, Universitas 21 – a significant endorsement of the growing international stature of UJ. Under South Africa’s National Development Plan (NDP), the Vision 2030 Awards honoured UJ in 2017 for the role the University plays in providing sound education to a diverse South African and international population.

UJ has been consistently ranked among the top five universities in South Africa by the QS World University Rankings and the Times Higher Education University Rankings systems in the last five years and in 2018 moved up to position number four in South Africa. Furthermore, its stature and academic robustness received a boost through its inclusion in the prestigious Shanghai Academic Ranking World Universities rankings in 2017 and was also positioned as the fourth best in SA in 2017 and 2018.

UJ is among the 364 pioneering institutions identified by education strategy-consulting firm Firetail as a new generation of “challenger” universities set to be globally influential in the next 15 years. UJ is set to make a significant mark in the global higher education arena in innovative and disruptive ways.

UJ boasts excellent, internationally recognised academic programmes based on curricula informed by cutting-edge developments in both undergraduate and postgraduate education. Our programmes prepare students for the world of work and for global citizenship.
UJ has approximately 50,000 students across its four campuses. We are the University of Choice for the working class, first generation student. We produce an output of 13,000 graduates annually and is gaining a proud reputation for making a sizeable contribution to the skilled workforce of the country, with an average 86% throughput rate for the last five years. Our student profile comprises 92% black students, with 28% from the poorest schools in South Africa and 60% of our students are first generation university graduates.

We are committed to the pursuit of excellence in our teaching and research; we produce graduates who are responsible citizens and play a meaningful role in the development of South Africa. We instituted major programmes within our Academic Development and Support unit to help our students overcome most social barriers so that they can focus on achieving academically. We pride ourselves on having one of the best student support structures in South Africa.

At our core, we are committed to facilitate economic development. We break the poverty cycle in thousands of working-class families by producing work ready graduates. Above all, by supplying the South African economy with a highly skilled workforce in critical areas, such as engineering, science, entrepreneurship, education and social science, we capacitate the economy for growth.
BUILDING A CULTURE OF GLOBAL EXCELLENCE AND STATURE

THE UNIVERSITY OF THE FUTURE

UJ continues to play a nurturing and pioneering role in restructuring higher education in Africa. The University of the Future will no doubt look very different due to the digital disruption. UJ is strategically aligning its research and curriculum focus to the brave new technological world. We are committed to generate innovative ideas and seek ways to challenge our students’ minds. UJ is resolute to create a space where open innovation and analytical minds can thrive.
UJ has leading experts that ensure the University embraces all new technology, excel in research and impart the knowledge necessary to bring the Fourth Industrial Revolution to the continent and its people.

UJ’s experts are led by UJ’s newly appointed Principal and Vice-Chancellor, Prof Tshilidzi Marwala, who took up office in 2018, to further advance its vision of excellence in teaching, research and innovation, internationalisation, public scholarship and community engagement and to fulfil the strategic goal of the University to become Africa’s epicentre of critical intellectual inquiry and a leader in the Fourth Industrial Revolution.

Prof Marwala’s research interests are multi-disciplinary and include the theory and application of computational intelligence to engineering, computer science, finance, social science and medicine. As a B-rated researcher, he has published nine books, over 300 papers in journals, proceedings, book chapters and magazines and holds three international patents. He is an associate editor of the International Journal of Systems Science (Taylor and Francis Publishers) and has been a reviewer for more than 40 ISI journals.

His global network is wide and includes being a visiting scholar at Harvard University, at the University of California at Berkeley, at the Wolfson College of University of Cambridge and at Nanjing Tech University. Prof Marwala is also a member of the programming council of the Faculty of Electrical Engineering at the Silesian University of Technology (Poland).

Through collaborative, forward-thinking, industry leading experts and creative academics, tutors and students, we develop new approaches to research, teaching and learning.
The ability of Africa to make the transition from a resource-based to a knowledge-based economy will depend in part on our ability to produce breakthrough research in mineral analysis, innovative research in energy resources and the scientific exploration of alternative energy sources.

We are entering the Fourth Industrial Revolution at remarkable speed. The advances in Artificial Intelligence (AI), big data analytics, robotics, automation, and digital finance will catalyse the revolution and profoundly change the face of society, economies, and industries. UJ is one of the leading academic institutions in South Africa in this revolution and the University ensures that industry specific research and ever evolving technological solutions drive our economy in the modern demands of a globalised and technology driven world.

As these advances herald a new social and economic construct, some fundamental questions arise. In parallel to our pursuit of technological progress, we need to harness and realise human potential through multi-disciplinary research to monitor the impact of these technological advances on the society it serves. We need to, now more than ever, realise the power of early childhood education and multi-cultural collaboration.

Through the establishment of the Global Excellence and Stature (GES) Flagship Institutes and Programmes, UJ influences the international search for these intelligent solutions to the grand challenges of our time.
THROUGH THE ESTABLISHMENT OF THE GLOBAL EXCELLENCE AND STATURE (GES) FLAGSHIP INSTITUTES AND PROGRAMMES, UJ INFLUENCES THE INTERNATIONAL SEARCH FOR THESE INTELLIGENT SOLUTIONS TO THE GRAND CHALLENGES OF OUR TIME.
For generations, scientists have attempted to create a substitute that can perform the same tasks or better than man. Rapidly advancing technology now makes it possible to create computer-based ‘human-like thought processes’ that can solve complex problems based on big data.

UJ’s Institute for Intelligent Systems (IIS) is a multi-disciplinary institute with expertise from highly qualified scientists and engineers as well as other disciplines like social and economic sciences. In terms of research, applied research and industrial application, the Institute focuses on systems intelligence and cognitive computing; big data analytics and deep learning; digital revolution and machine learning.

Artificial Intelligence (AI), Industry 4.0, cognitive computing, big data analytics, machine learning and robotics increasingly appear in the headlines of our news feeds. UJ’s IIS is embarking on major partnerships with industry, government and communities to dismantle big data problems to the economic benefit of South Africa. The IIS is positioned to support our partners in bridging the gap between technology and people and ensuring a more sustainable economy for South Africa.

Big challenges in society and industry – such as fraud-prevention, better water resource management, efficient and inexpensive energy, advanced education and better healthcare for all – are some of the challenges that IIS aims to tackle more effectively with the combination of big data and intelligent systems designed to analyse, act on and improve. Such intelligent systems are creating new opportunities for industry and business, and new experiences for users and consumers.

Some of the areas in which IIS is currently active include:

- Block chain technology
- Intelligent transport systems – from port to roads to improve transport in South Africa
- Visible Light and Power Line Communications
- AI and the impact thereof on humans and the current workforce
- Last Mile Access for Broadband Internet in rural areas
- Security and Privacy of Applications in Emerging Networks for rural areas.

The pace of innovation is going to lead us to interesting places, and perhaps sooner than we think – UJ is ready. We realise that we are really just at the tip of the iceberg with AI. In a few years, AI will be so intertwined and pervasive within all industries that life on earth may become impossible without it. For this reason, UJ’s IIS will continue to explore new ways of applying AI and other advanced technologies for a better future for all.
There is an ever-increasing and overwhelming desire in African people to have a formal expression of their oneness. What if we can create an ‘Afrika’ for Africans? An ‘Afrika’ where democracy of an African majority rules, and where the continent's potential is fulfilled to independently provide for its one billion people?

At UJ, we are reimagining the future of Africa and its scattered diaspora in the Caribbean, the Americas, and Europe. We are passionate about pan-Africanism. So passionate and committed, that we established the Institute for Pan-African Thought and Conversation (IPATC). IPATC is ideally positioned in Johannesburg – South Africa’s economic hub – a true Afropolitan megapolis, where knowledge and research is produced, collaborating with key African thought-leaders.

The ultimate aim remains the total liberation of the African continent and its people in the wider diaspora. At UJ, we continue to question everything. We do not accept the status quo and we do not settle for mediocrity, but consistently aim for excellence. We collaborate with our fellow Africans, and together we map out our destiny by reimagining a brighter future of a continent and its diaspora of politically free citizens and economically industrialised states. We start by asking: “What if?”

What if the spirit of Pan-Africanism could be revived in all spheres: political, social, economic, and cultural? What if Africa could be united and Africans could promote regional integration and end conflicts on a troubled continent? What if advances in global education, health, and technology from Africa could empower Africans? What if we could address the tension between the economic and cultural independence of African people with solutions from within – by Africans, for Africans, across Africa and its diaspora?

By 2050, there are expected to be two billion people in Africa. A billion will be children, nearly half of the world’s youth population. Africa is a youthful continent, and issues of youth development and employment must be prioritised. What if Africa could lead the world with the youngest population, while many of the industrialised countries’ populations are aging? The most fundamental social and political transformations in the world are driven by young people, with 60% of Africa’s population being under 25. The current generation of youth is the most connected in the history of humanity. This group represents a catalytic change agent of the current reality. What if we could tap into the African fountain of youth, and develop the world’s next wave of young innovators?

What if we could break the continent’s structural constraints through promoting effective regional integration in Africa and increasing intra-regional trade beyond its current anaemic 12%? Why not utilise Africa’s size, diversity, and economies to build an African powerhouse? What if we could accelerate
the wave of change that is happening right now in Africa? Changes that are being driven by growing levels of Internet access. Access to Internet-based services and technology through mobile phones is exploding on the African continent. Africa has more mobile phones than the US and Europe. What if we could tap into this explosion in order to open up more commercial opportunities, as well as access to information and services in areas such as education, health, and agriculture that could transform the lives of Africans on the continent and in its diaspora?

What if we could reimagine a future for Africa as an economic powerhouse that successfully achieved robust structural transformation that reduces our dependence on commodities and creates viable jobs for Africans?

What if we could ensure a future of African unity among its one billion people on the continent and 134 million citizens in its scattered diaspora? A future without conflicts and with shared political values? What if we could foster African unity and reinforce our economic, social, and cultural bonds with each other? Could we reinforce our ties and solidarity? What if African countries could be supportive of one another and learn from each other’s experiences?

Can we dream of an Africa and its diaspora in which the riches of the continent are used for the benefit, upliftment, development and enjoyment of African people and its diaspora citizens? Yes, we have a dream. We are the people of Africa.
The Johannesburg Institute for Advanced Study (JIAS) is a joint initiative of UJ and Nanyang Technological University (NTU), Singapore. Its goal is to promote research beyond the regular teaching and research activities at institutions of higher learning.

JIAS, a space for critical thinking and engaged enquiry, transcends the regular boundaries of academic disciplines. The Institute has established a bridge between African and Asian thought in order to explore the difference and to deliberate on the shared bond between knowledge and learning in both cultures.

Through a series of pioneering programmes, JIAS fosters cutting-edge research that addresses the current ethical and intellectual challenges confronting our society in this interconnected world. JIAS serves as a pre-eminent centre for research and intellectual inquiry.

When set against the pace of progress in digital technology and the increasing complexity of issues facing global society, both the humanities and the natural sciences are approaching a major crossroad. JIAS’s objective is to chart collaborative and focused scholarly initiatives in both – and between – the humanities and sciences.
THE UNIVERSITY OF JOHANNESBURG
CONFUCIUS INSTITUTE

THE PHILOSOPHY OF CONFUCIUS EMPHASISES
PERSONAL AND GOVERNMENTAL MORALITY,
correctness of social relationships,
justice and sincerity.
UJ and Nanjing University, located in Nanjing, China, and one of the oldest and most prestigious institutions of higher learning in China, share these values. From these shared values, UJ and Nanjing University started the UJ’s Confucius Institute – one of only five such institutes in South Africa.

It is through this newly formed collaboration that research, interaction between students and staff, exchange programmes and learning about each other’s cultures and languages are now realised.

China has moved from one of the poorest countries in the world to the second largest economy globally in a very short period of about 30 years. The Chinese economy remains the major driver of global growth for the near future. Chinese Confucianism and the African concept of Ubuntu are two strains of ethical philosophy that share a substantial number of values. Through our shared values we can work towards the advancement of both China and Africa.

Since 1978, China has lifted more than 500 million people out of poverty, creating one of the largest economic miracles in the later 20th century. China’s success and its unprecedented poverty reduction are sources of inspiration for Africa.

UJ’s Confucius Institute continues to drive research, science, and technology through solid educational systems to progress our people to become a major driving force in the world’s high-tech engineering industries.
GES PROGRAMMES

EARLY CHILDHOOD DEVELOPMENT
All over the world, governments recognise early learning and development as a political priority. UJ’s Department of Childhood Education and the Centre for Education Practice Research (CEPR) on the University’s Soweto Campus are at the forefront of changing the educational landscape for early school learning and for the teachers of young children. In this research centre, the South African Research Chair of the National Research Foundation specifically researches children’s reading and writing of science and mathematics in English. The UJ Department of Childhood Education (DCE) addresses the education of a new generation of primary school teachers as enablers of learning for young children, most of whom learn through the medium of English, as a second or third language, in the upper primary school.

Through key research projects, international collaboration and ongoing development of pioneering programmes in teacher education, UJ is making a significant impact in the field of childhood education. Evidence of this dedication is the founding of the Funda UJabule Primary School on the University’s Soweto Campus. As the first of its kind in South Africa, this school serves as a teacher education model endorsed by the Department of Higher Education and Training. Known as a ‘teaching school’, populated by children from Soweto, student teachers learn the profession by observing mentor teachers and by practising teaching in isiZulu, Sesotho and English over four years. This public school is also a research laboratory for pilot studies and serves as a resource centre/development hub for schools close to the Soweto Campus. The central organising framework of the programmes, longitudinal child study, is a mainstay of the model.

From the time of conception to the first day in Grade 1, development happens at a pace exceeding that of any subsequent stage of life. Over one million children are born in South Africa each year (Stats SA, 2015) and we need to prepare their developing minds, their social and emotional adaptation to early 21st century life and to live in the knowledge society.
UJ is reimagining a brighter future for the children of not only Soweto, but also on the sub-continent of Africa, developing research and teacher education models suited to the realities of our time and place. Students from the SADC region study in the postgraduate programmes in Childhood Education and bring richness from Namibia, Zimbabwe, Mozambique and Malawi. With them, our collaborators at the University of Helsinki, Harvard University and the University of Duisburg-Essen bring richness of experience and the production of new knowledge.

The DCE has a focus on the development of educational material, which serves a dual purpose of increasingly incorporating technology in course materials as well as servicing the Knowledge for Action website (https://knowledgeforaction.co.za), launched in November 2017. Some highlights include the production of four short informational video packages on aspects of child development. The aim of the website is to ensure that the knowledge produced through research and artefacts is freely accessible to student teachers, teachers and parents, locally and internationally. The programme’s flagship status, predicated upon the systematic integration of research, teacher education programmes, school experiences and academic community engagement, aims to develop in student teachers the skills of critical thinking, collaboration and problem solving, necessary to cope as teachers in the 21st century Fourth Industrial Revolution.
We are sitting on the world's most sought-after minerals real estate. Our current actions will determine the future of this valuable land. Mining remains one of the biggest industries in South Africa, which boasts the most valuable remaining mineral deposits in the world. Sustainable and economical mining requires efficient methods of predicting where mineral deposits may be, finding those and managing mining operations responsibly, to the benefit of future generations.

Through the PPM research group and Centre of Excellence for Integrated Mineral & Energy Resource Analysis (CIMERA), the Geology Department at UJ is unique in Southern Africa for its combination of economic geology, hominid dating research, medical geology, Antarctic research, and expertise in finding out how old mineral deposits and rocks of any age are. CIMERA collaborates with national and international educational institutions to tap into collective expertise in mapping and describing strategic mineral deposits, research towards improving mining exploration and efficiency, and understanding the formation of mineral deposits during 'early earth'. The core focus of CIMERA’s research is to ensure the sustainable utilisation of mineral and fossil energy for South Africa and the African continent.

Africa is moving into a new era where the demand for utilisation of its large resources of bulk commodities like iron, manganese and bauxite is rapidly rising, but sufficient knowledge to ensure long-term economic viability of extraction is lacking. CIMERA leads human resource training and development to guarantee a supply of highly trained mineral and energy resource analysts to ensure sustained development of the scientific and economic sectors of mineral and energy resource industries in Africa. The Centre also brokers important information that relates to mineral and energy resources to policy makers and the community in general.

Our current actions determine Earth’s future. CIMERA is ensuring sustainable mineral and fossil energy for our shared futures through its innovation and research.
CIMERA LEADS HUMAN RESOURCE TRAINING AND DEVELOPMENT TO GUARANTEE A SUPPLY OF HIGHLY TRAINED MINERAL AND ENERGY RESOURCE ANALYSTS TO ENSURE SUSTAINED DEVELOPMENT OF THE SCIENTIFIC AND ECONOMIC SECTORS OF MINERAL AND ENERGY RESOURCE INDUSTRIES IN AFRICA.
The UJ’s Graduate School of Architecture (GSA) is at the forefront of the drive for change and plays a critical role in promoting African architecture on an international stage. It has positioned itself as a leader to the rest of the continent in architectural education and is widely acknowledged as a ‘game-changer’ for its inventive teaching methods. By encouraging critical and creative thinking, the GSA offers, world-class, cutting edge and transformative architectural education to a new generation of African students.

Currently, most internationally prominent African architects studied overseas. Very few studied on this continent. GSA establishes a local context for African students with a message to the younger generation of architects that they do not have to go to London, Berlin, or New York to excel in the profession. GSA students, upon graduation and through their entry into the marketplace as professionals, will help create a continent-wide network that will benefit the entire industry to unearth the talent and ideas developed in Africa.

As the youngest School of Architecture in South Africa, the GSA has grown from 23 students in 2014 to 105 in 2018. Through its transformative pedagogies, which are a multi-institutional teaching and a research programme, the School aims to transform both the way architecture is taught and what is taught. It reinforces forward-thinking and is open to adopting and embracing futuristic technologies that are commercially available and in use today, such as 3D printing, unmanned drone aircraft, and robotic construction system that will transform the industry in the anticipation of creating a better, more sustainable, more equitable and beautiful world.

The GSA Flagship School enjoys Visiting Professorship status, where experienced staff members present guest lectures and receive sponsorships for a publication that showcases student work. It is also committed to broadening the general understanding and value of architectural research, nationally as well as continent-wide. Staff are encouraged to publish and contribute to debates both locally and internationally. To this end, the GSA Flagship School’s focus has been on international partnerships and collaborations, rather than on local or national collaborations. The GSA’s long-term ambition is to become the biggest and best school of architecture and urbanism on the African continent by 2027 and to be recognised globally by making meaningful and lasting changes to the African built and natural environments.
Current law students are part of a generation faced with global challenges, such as energy, water, environment, urbanisation, poverty, global governance and ethics. All of these challenges have legal dimensions. Furthermore, students will enter workplaces that use data, algorithms and AI systems. Technology is already available to assist with analysing large amounts of unstructured data in order to retrieve and summarise specific information necessary for legal cases. The integration of worldwide financial and commercial markets has occurred at an astonishing speed and our law students are going to have to stay abreast of these global occurrences.

Although globalisation is not new, it is gaining momentum due to the growth of the Internet of Things, the automation of legal processes, developments in data security and emerging technology tools. As law firms continue to expand their footprint worldwide, globalisation will continue to reshape the landscape of the legal industry in the coming years.

With the global economy creating an interdependent world, the law governing market transactions has taken on an ever more important role. The era of economic globalisation we inhabit today is vastly more interconnected than ever before.

Our students must inhabit this new globalised arena when they graduate. A large part of the knowledge and skill necessary for dealing with future challenges is not developed through ‘traditional’ learning programmes. In seeking grounding concepts, theory and practical application of the principles of law, one of UJ’s flagship programmes, International Commercial Law, is pursuing and developing the knowledge they will need to solve the problems they will face, particularly in global private-law of international trade, with an emphasis on private-international legal issues.

Students are required to be creative and innovative, embark on critical thinking and problem solving, communication and collaboration. All these skills are needed to execute as professionals within a South African and African context, and as global citizens. International Commercial Law is important for South Africa’s global standing and developing economy. There is not much knowledge in South Africa in this field, so UJ’s Faculty of Law is addressing the lack of skills and knowledge through the LLM offering, which concentrates on private law and aspects of international trade, with an emphasis on private-international legal issues. UJ is developing young law professionals who can adapt, innovate and adjust.
UJ has turned its focus on nanotechnology for water treatment and water quality monitoring. Nanotechnology is a fast-developing discipline internationally and in South Africa, and involves managing and manipulating matter on an atomic level. It deals with structures between one and hundred nanometres in size. (A nanometre is one billionth of a metre).

As a revolutionary empowering technology, nanotechnology has the potential to offer continuing economic benefits for jobs and investment in the materials, energy and healthcare sectors. UJ has established internal and external networks that show substantial experience in nanotechnology and water treatment.

UJ’s research in nanotechnology and water is a collaborative effort, which creates an intellectual environment that focuses on a multidisciplinary approach. The ground-breaking research reflects on the design and creation of functional materials, structure devices and systems and directly controls matter at Nano level.

The aim of the Programme is to make the research available for publication and teaching purposes and applying solutions developed through research for practical application. By broadening the scientific knowledge base of this area of research, UJ is supporting the application of nanotechnology into new areas of purpose.
PARTNER WITH US IN REIMAGINING OUR FUTURE

We invite you to reimagine the future with us. We know what we must do to ensure a bright future for Africa. We are no longer postponing, procrastinating or pondering. UJ’s GES flagship institutes and programmes reflect our commitment to purposefully and actively ‘reimagine’ where it is needed most.

We need to take hands with industry and public partners to effect the change needed for our country and our continent. By advancing one or more of UJ’s institutes and programmes, you have the opportunity to align your investment to the strategy of your organisation.

Through UJ’s pioneering research in mineral analysis, innovative research in energy resources, water and the scientific exploration of alternative energy sources, we are supporting Africa to make the transition from a resource-based to a knowledge-based economy.

The Fourth Industrial Revolution brings with it opportunities to reinvent South Africa’s role on the global stage. UJ is resolute to supply our economy with the technology and relevantly skilled graduates to move South Africa from the fringes of globalisation. UJ is re-examining the way in which we teach our children, approach law, collaborate as Africa and integrate Asian principles to ensure human and social expansion in this new paradigm.

Your investment in UJ will ensure multi-disciplinary research, innovation and teaching that could put you ahead of your field as we enter the Fourth Industrial Revolution and allow our country and continent to thrive.

We will offer partners who invest in UJ’s GES institutes and programme a host of benefits, including:

- **Publicity and branding**: UJ will use our media platforms to advertise this partnership and to promote your brand in relation to the GES institute and programme initiative. Additionally, the Marketing and Communications Department at UJ will endeavour, wherever possible, to promote the partnership in the public space through its media contacts.

- **Tax break**: The University will issue an 18A Tax Certificate in terms of the Income Tax Act for the donation towards the project.

- **B-BBEE Scorecard**: You will benefit from the University’s Broad-based Black Economic Empowerment status.

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Your investment in UJ is an investment in the future of South Africa, the continent and the world. Reimagine the future with us. Together we can change lives.